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Record of Decision:

SUMMITVILLE MINE
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ADMINISTRATIVE RECORD

INTERIM RECORD OF DECISION

FOR

CROPSY WASTE PILE, BEAVER MUD DUMP/
SUMMITVILLE DAM IMPOUNDMENT,
AND MINE PITS

Summitville Mine Superfund Site
Summitville, Colorado

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DECLARATION FOR THE INTERIM RECORD OF DECISION

Site Name and Location

Summitville Mine Superfund Site, Summitville, Rio Grande County, Colorado.

Statement of Basis and Purpose

This decision document presents the selected interim remedial action, for reducing or eliminating acid mine drainage from the Cropsy Waste Pile (CWP), Summitville Dam Impoundment (SDI), Beaver Mud Dump (BMD), and Mine Pits at the Summitville Mine Superfund Site (Site) in Rio Grande County, Colorado chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFK Part 300).

This decision is based on the administrative record for this Site.

The State of Colorado Department of Public Health and Environment concurs with the selected interim remedial action.

Assessment of the Site

Interim remedial actions are appropriate "to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed." ("Guide to Developing Superfund No Action, Interim Action and Contingency Remedy RODs", EPA. OSWER Publication 9355.3-02FS-3, April 1991). Therefore, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the interim remedial action selected in this Interim Record of Decision, may present imminent and substantial endangerment of public health, welfare, or the environment.

Description of Selected Remedy

This interim remedy addresses the reduction or elimination of acid mine drainage (AMD) from the CWP, SDI, the BMD, and the Mine Pits. The AMD originates from sources altered or disturbed during mining activities at the Site.

This interim remedy is consistent with current and anticipated future remedial activities to be implemented to attain sitewide remediation goals

This interim remedial action is anticipated to produce continued reduction of contaminated water flows to the Alamosa Watershed. The results of the interim remedial action will be routinely monitored to determine the additional actions needed at each portion of the Site to achieve the final, sitewide remediation goals.

The selected alternative is feasible, implementable, and cost effective in reducing AMD at the Site and meets all criteria for the selection of interim response actions required by Section 300.430 of the NCP.

The major components of the selected interim remedy are Listed below:.

- Excavation of the CWP m an elevation of 11,620 feet;
- Excavation of the BMD and SDI;
- Line the Bottom of the Mine Pits with a layer of pH neutralizing material; and
- Placement and capping of excavated material in the Mine Pits.

It is anticipated that the completed interim remedial actions will result in a reduction of contaminated water flows which currently require treatment and control from the Site. The results of the interim remedial actions will be monitored to determine the additional actions necessary at the Site to achieve the final, sitewide remediation goals.

No significant changes have been made to the preferred alternative as it was originally presented in the CWP, SDUBMD, and Mine Pits Focused Feasibility Study.

Statutory Declarations

This interim remedial action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements (ARARs) for this interim limited-scope action, and is cost effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the Site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed in the final response action. Subsequent actions are planned to fully address the threats posed by the conditions at this Site. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the interim remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim ROD, review of this Site and of this remedy will be ongoing as the EPA continues to develop final remedial alternatives for the Site.

<IMG SRC 0895097>

William P. Yellowtail December 15, 1994
Regional Administrator
U.S. Environmental Protection Agency, Region VIII

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1.0 DECISION SUMMARY

1.1 Site Location and Description

The Summitville Mine Superfund Site is located about 25 miles south of Del Norte, Colorado, in Rio Grande County (Figure 1). It is located within the San Juan Mountain Range of the Rocky Mountains, approximately two miles east of the Continental Divide, at an average altitude of 11,500 feet. The 1,231 acre mine permitted area is positioned on the northeastern flank of South Mountain. The disturbed area at the Site covers approximately 550 acres (Figure 2). On the North, this area is bounded by the deserted town of Summitville and by Wightman Fork Creek It is bounded by Cropsy Creek to the east and the peak of South Mountain to the southwest. The Site is located in the Rio Grande Drainage Basin near the headwaters of the Alamosa River. Two tributaries drain the Site - Wightman Fork Creek and Cropsy Creek. The confluence of Cropsy Creek and Wightman Fork is located on the northeastern perimeter downstream of the Site. Wightman Fork Creek drains into the Alamosa River approximately 4.5 miles below the Cropsy Creek confluence.

1.1.1 Climate

The Site's climate is characterized by long cold winters and short cool summers. Winter snowfall is heavy and thunderstorms are common in the summer (SRK, 1984). Temperatures range from a high of 70°F and a low of 17°F in the summer to a high of 40°F and a low of-25°F in the winter. The Site receives an average of 55 inches of precipitation annually, mostly in the form of snowfall, and has an annual evaporation rate of approximately 24 inches (Remedial Measures Plan, 1992).

There is a relatively snow-free period of 5-6 months from May through October. This time period is regarded as the "construction season". Site access and operations during the rest of the year requires a significant amount of mow removal. Continued water treatment and flow, or meticulous winterization, is required to prevent water from freezing in the pipes.

1.1.2 Topography

Approximately 550 acres of the Site is comprised of heavily altered terrain due to mining operations. The Site's pre-1870 topography consisted of upland surfaces, wetlands, and South Mountain peak. The predominant Site ground cover as alpine tundra at the higher elevations with coniferous forest and subalpine meadow in the lower elevations. The mountains which surround the Site, including Cropsy Mountain to the south, are between 12,300 feet and 12,700 feet in elevation.

The Wightman Fork drainage covers approximately 3.0 square miles upstream from the Wightman Fork diversion. The catchment elevations range from 11,225 feet to 12,754 feet. The Cropsy Creek drainage area entails 0.85 square miles on the northeast slopes of the Cropsy Mountain and the southern slopes of South Mountain. Elevations within this drainage range from 12,578 feet down to 11,200 feet at the Cropsy Creek confluence with Wightman Fork (Klohn Leonhoff, 1984). Wightman Fork drains into the Alamosa River approximately 4.5 miles from the Cropsy Creek confluence.

Disruption of the topography began, on a limited scale, in 1870 with placer gold mining in stream-formed alluvial deposits. This placer mining was followed by open cut mining on gold-bearing quartz veins. Underground mining followed. As mining production depths increased, several processing mills were constructed to handle the increased capacity and produce a concentrate suitable for transit. This initial mining phase lasted through 1890. Additional underground mining occurred from 1925 to 1940 and resulted in surface deposition of waste rock near the adit entrances. Additionally, piles of mill tailings were placed downgradient from the stamp mills and the 1934 flotation-cyanidation mill, which was located at the site of the present BMD.

Further surface disruption of the topography resulted from work in the late 1960's when Wightman Fork was diverted north to allow construction of a dam and tailings pond. With this new impoundment, mill tailings were put on the BMD down to the area above the SDI. The SDI was formally referred to as the Cleveland Cliffs Tailings Pond.

The most dramatic alterations of the surface started in 1984 with the construction of the mine pits and dumps associated with Summitville Consolidated Mining Company, Inc.'s (SCMC/'s) open pit heap leach gold mine. The main topographical feature is the highwall of South Mountain. This highwall is fractured and has a one to one (horizontal to vertical) slope.

Summitville is located near the margin of the Platoro-Summiville caldera complex. Rocks in the mine area consist of South Mountain Quartz Latite Porphyry. The porphyry is underlain by the Summitville Andesite. The contact between the latite aud andesite is intrusive, faulted in some areas and is nearly vertical. On the north side, the contact is fault-bounded by the Missionary Fault. South Mountain is bounded on the southwest by a large northwest-southeast trending regional fault called the South Mountain Fault. The South Mountain Quartz Latite Porphyry is bounded to the west, on both sides of the South Mountain Fault, by slightly older Park Creek Rhyodacite. It is overlain at higher elevations by erosional remnants of slightly younger Cropsy Mountain Rhyolite (Stoffregen, 1987). Figure 3 shows a geologic section of the Cropsy Valley.

South Mountain volcanic dome emplacement, alteration, and mineralization occurred in rapid sequence approximately 22.5 million years ago (Rye, et. al., 1990). Magmatic, sulfate-laden water expulsed from the quartz latite magmas was hot and highly acidic ($pH \leq 2$, temperature of 250° C - Stoffregen, 1987), and caused extensive alteration to the quartz latite. Alteration occurs in four sequential zones: the massive vuggy silica zone, the quartz-alunite zone, the quartz-kaolinite zone, and the clay alteration zone. The massive vuggy silica zone is often a highly porous zone in which all major elements but silica and iron were leached by acidic solutions and replaced in places by excess silica. This zone occurs in irregular pipes and lenticular pods, and generally shows greater vertical thin lateral continuity (Stoffregen, 1990). The next outwardly occurring zone is the quartz-alunite zone, in which feldspars of the quartz latite porphyry were replaced by alunite. This zone grades outward to a thin quartz-kaolinite zone, which is not always present, and then into an illite-montmorillonite- chlorite zone in which feldspar and biotite grains were replaced by illite and quartz, with lesser kaolinite and montmorillonite. The quartz-alunite and clay alteration zones are the most volumetrically significant. Fine-grained pyrite is disseminated through the groundmass in all zones (Stoffregen, 1987).

Summitville mineralization is an example of epithermal Au-Ag-Cu mineralization associated with advanced argillic alteration. Mixed magmatic and surface water (derived from snowmelt and rainfall), less acidic and more reducing than the magmatic water that produced the alteration zones, deposited metals and metallic sulfides at shallow (<1 km) depths (Rye, et al., 1990). Mineralization is associated mostly with the porous vuggy silica zone, and occurs as covellite + luzonite + native gold changing with depth to covellite + tennanite. Gold also occurs in a near-surface barite + goethite + jarosite assemblage that crosscuts the vuggy silica zone (Stoffregen, 1987).

Post-volcanic geologic processes have been largely erosional. The two major streams that drain the Site, Cropsy Creek and Wightman Fork, tend to follow the quartz latite/andesite contact. Numerous springs and seeps occur at this junction between the fractured quartz latite porphyry aquifer and the underlying dense andesite aquitard.

Site cover material consists of topsoil, silt, clays, and gravel. The topsoil is described as grey/brown/orange, non-plastic with a trace of roots and sand. Clays are of low to medium plasticity with some gravel.

1.1.4 Hydrogeology

Ground water at the Site is present as a series of intermittent, shallow, perched aquifers. Shallow ground water occurs in surficial deposits consisting of colluvium, "slope wash" alluvium and/or glacial ground moraine; and weathered part. of the Summitville Andesite. These shallow systems eventually discharge to surface water. The upper perched aquifer system also contributes to the ground-water recharge of the fractured bedrock system. Numerous springs and seeps cover the entire Minesite, the greatest number at the locus of the distal edge of the dome. Most of the springs and seeps flow in direct response to precipitation, with high and low flows corresponding to high and low flow of the surface water system in the area.

A natural surface water drainage system exists along the southern portion of the Summitville Site. The surface water drainage system includes Cropsy Creek and Wightman Fork. Extensive re-working of both drainage systems has been conducted.

1.1.5 Present Surrounding Land Use and Populations

The Site is surrounded by National Forest Service land (Rio Grande National Forest). The multiple-use designation of this land gives it a high level of desirability for snow mobiling, cross country skiing, hiking, camping, horseback riding and picnicking. Additionally, logging activity is on-going adjacent to Park Creek Road and other roads adjacent to the Site. During the summer months, domestic cattle and sheep graze in the surrounding area and during the winter months, the surrounding area is heavily used for hunting.

The distance to the nearest off-Site building is 2.1 miles to the east (EPA, 1992). The water from the Site flows past the town of Jasper into Terrace Reservoir, both of which are recreational areas. Private residences and a Phillips University Camp use water from wells adjacent to the Alamosa River. Below the Terrace Reservoir, the river flows past the town of Capulin which contains two municipal wells and many domestic wells. Throughout this drainage area, homes, farmsteads and ranches depend upon alluvial wells or river water for potable or agricultural water production. However, recent EPA analysis indicates that the

Site has not impacted alluvial drinking water supply wells (Morrison Knudsen 1994). Additionally, water from the Alamosa River is used within the Monte Vista Wildlife Refuge and in the La Jara Creek system through the Empire Canal (District Court, Rio Grande Co., 1992).

1.2 Site History and Enforcement Activities

1.2.1 Site History

Placer gold was discovered in Wightman Gulch in the summer of 1870 (Guiteras, 1938). The lode deposit was found near the headwaters in 1873 and by 1875 open cut workings had been established. The ore consisted of native gold in vein quartz, reportedly associated with limonite and other ion oxides, which comprised the surficial, oxidized zone of the deposit. Because this zone reportedly extended to 450 feet below the ace, adits and shafts had to be driven into the veins (Garrey, 1933). There was only minor production in the mine area from 1890 to 1925.

In 1897, the Reynolds Adit was driven into the Tewksbury vein, located below the central portion of the contemporary Summitville pit. The Adit was completed in 1906 (Knight Piesold, 1993). Reports of acidic water exiting the adit soon followed (Garrey, 1933).

A significant gold find occurred in 1926 when high grade ore was struck. From 1926 to 1931, 864 tons of ore was extracted. The Reynolds Adit was rehabilitated to provide haulage and development access. Plans were made to connect the Reynolds to the Iowa Adit, 540 vertical feet above the Reynolds. This connection was completed in 1938. Iowa ores were then dropped down to the Reynolds level for haulage. The Reynolds and the Iowa Adits also provided drainage for the main workings (Knight Piesold, 1993).

In 1934, a 100 ton-per-day flotation/cyanidation mill and gold retort was installed at the site of the present BMD. Records indicate that dewatering flitrate from the flotation circuit was discharged directly into Wightman Fork throughout the mid-1930's.

In 1941, three tunnels were in operation: the Iowa, Narrow Gauge, and Reynolds. During World War II, the government mandated the termination of mining of non-essential minerals to focus on essential minerals needed for the war effort. Gold production ceased.

From 1943 to 1945, a high grade copper vein found in the Narrow Gauge and Reynolds was developed. By 1944, only the Narrow Gauge Tunnel was operating. In 1947, the Reynolds was again rehabilitated. Approximately 4,000 feet of rail needed replacement due to deterioration from acidic water. By 1949, the water flow discharge from the Reynolds ranged from 100-200 gallons per minute (gpm) (Stevens, T.A, 1960).

From 1950 to 1984, the Minesite was the target of several exploration and underground rehabilitation programs. Production of copper, gold, and silver was sporadic. An extensive drilling program was conducted in the late 1970's and early 1980's to delineate a potentially minable gold deposit (Knight Piesold, 1993).

The underground and surface operations during the original discovery of gold to the early 1980's resulted in surface deposition of waste rock near adit entrances and deposition of mill tailings downgradient of the original mill. An attempt to process ore to extract copper content in the late 1960's and early 1970's resulted in a diversion of Wightman Fork from its original route to further north of the existing tailings, construction of the SDI (1969) and deposition of mill tailings east of existing tailings piles.

During recent operations (1984-1991), SCMCI, a wholly-owned subsidiary of Galactic Resources, Inc., developed the remaining mineral resolves as a large tonnage open pit heap leach gold mine. Gold containing ore (9.7 million tons) was mined, crushed and heaped onto a constructed clay-and-synthetic-lined pad. A solution containing 0.1-0.5% sodium cyanide was applied to crushed ore on the Heap Leach Pad (HLP) and was allowed to percolate through the ore to leach out gold. The solution was then pumped from the ore and gold was removed from the leachate with activated carbon. The leaching solution was rejuvenated by restoring the target cyanide level and recycled through the heap. Gold was stripped from the carbon, precipitated from the stripping solution, smelted to make dore metal, and sold.

The Summitville HLP is a "valley fill" design. This design differs from more widely employed designs in that it is more of a lined depression, or rock filled pond, than a lined leaching "pad". Utilization of a valley fill design usually results from topographic limitations that make construction of a free draining pad difficult. The process solution was pumped directly from the HLP to the gold recovery plant. The more common leach pad design enables water percolated through ore to constantly dram to a "pregnant solution pond" outside of the HLP, rather than being held in the same containment area as the crushed ore. The design of the HLP as a continuous water containment structure prevents the natural drainage of water from the cyanide bearing pad and complicates the closure of the ore pile.

The HLP containment feature was constructed in a portion of the valley occupied by Cropsy Creek. Cropsy Creek was moved to allow construction of the HLP. After diversion of Cropsy Creek, a portion of the valley was enclosed by dikes. The area between the dikes was contoured and lined and became the HLP.

Open pit mining operations conducted by SCMCI did not expose standing ground water in the mine pit. Infiltration of surface water (derived from snowmelt and rainfall) through the pit may have resulted in elevated dissolved metal concentration in the water draining from the Reynolds Adit. This trend is observed when compared to the available pre-open pit drainage data.

During the SCMCI operation, topsoil was stripped and placed into stockpiles. Other overburden and waste material was used for road and dike construction, placed into the Cropsy Waste Dump and the North Pit Waste Dump (NPWD), and placed over the historic mill tailings to form the Beaver Mud Dump. Difficulties in processing some of the ore resulted in formation of the Clay Ore Stockpile, near the present solution pumphouse location, and an in-pit stockpile. Figure 2 illustrates these areas.

The last ore tonnage was placed on the HLP in October 1991. Addition of sodium cyanide to the ore continued until March 1992. After mining operations were concluded, SCMCI proceeded toward Site cleanup and closure by converting the gold recovery plant to a cyanide destruction facility for HLP detoxification, converting the existing alkaline chlorination water treatment plant to a sulfide precipitation process, and installing a treatment plant to process Reynolds Adit drainage.

1.2.2 Enforcement Activities

In February of 1991, after monitoring rising concentrations of cadmium, copper, zinc and cyanide in Wightman Fork, the State of Colorado cited violations of water quality legislation and issued a Cease and Desist Order to SCMCI (Holm, 1991).

On December 3, 1992, SCMCI declared bankruptcy and announced that financial support of Site operations would not continue beyond December 15, 1992. On December 16, 1992 the EPA Region VIII Emergency Response Branch, as a part of an Emergency Response Removal Action (ERRA), began treating cyanide-contaminated leachate from the HLP and AMD from three significant sources: the French Drain Sump, the Cropsy Waste Pile, and the Reynolds Adit (Ecology and Environment, 1993).

Site operation oversight was undertaken by the United States Bureau of Reclamation (USBR) under an inter-agency agreement with the EPA. In December 1992, Environmental Chemical Corporation (ECC), under the direction of the USBR, began conducting engineering evaluations of the water treatment processes and subsequently began improvements to water treatment processes and facilities.

The Site was added to the Superfund National Priorities List (NPL) on May 31, 1994.

1.3 Community Participation

The Proposed Plan for the Summitville Mine Site was released to the public in August 1994. The Proposed Plan, the Focused Feasibility Study, and other documents in the Administrative Record are available at information repositories at the following locations: Del Nolte Public Library located in Del Norte, Colorado; the Conejos County Agricultural and Soil Conservation Service located in La Jara, Colorado; and the EPA Superfund Records Center located in Denver, Colorado.

Public meetings were held in Alamosa, Colorado on September 8 and October 12 to present the Proposed Plans and to take public comment. The comment period was extended 30 days to October 23, 1994.

Highlights of community participation are summarized as follows:

- When EPA took over the Site in December 1992, there was a great deal of public interest, mostly from farmers downstream of the Site who were concerned that their irrigation water would be contaminated. As EPA worked to reduce the chance for a large toxic spill and began more water treatment at the Site, the farming community became satisfied that there was no imminent danger of contaminating their water supply. Since that time there has been a decreased interest about the Site from the general public. The interest in the Site nationally has been very high due to the media using Summitville as a "red flag" for the need for mining reform.

- In June 1993, a Superfund informational workshop was provided to the public in La Jara, Colorado.

- On August 2, 1993, a public meeting was held in Alamosa, Colorado describing alternatives for reducing AMID from the CWP, the BMD, the SDI and the Mine Pits. An Engineering Evaluation/Cost Assessment (EE/CA) fact sheet was published. Public comment was taken until September 3, 1993.

- The Community Relations Plan for Summitville was written and distributed in September 1993. The Community Relations Plan provides a guide for EPA's community involvement program based on interviews with local citizens.

- A Technical Assistance Grant (TAG) was awarded for the Site in February 1994. This group is now well organized and has hired several consultants. The TAG Group has been active in the area in an attempt to generate interest in the Site. They have published regular Summitville columns in the Valley Courier newspaper and have held informational meetings.

- EPA held a briefing for Congressional aides in May 1994.

- Press releases have been written dealing with the following:
  - Proposal to place on the National Priorities List (NPL),
  - Listing on the NPL,
  - Announcing meetings,
  - Availability of materials,
  - Comment periods,
  - Availability of work through bid process,
  - Bid awards, and
  - Status of work at the Site.

- Five Site Status Updates have been written and distributed to over 200 interested parties as well as a year end report for 1993.

- Articles about the mine were written by local newspaper writers and appeared at least weekly for the past year. Files of these newspaper articles are available in the Community Relations office and will be placed in the information repositories.

- In December 1993, the EPA produced and distributed copies of videos of the Summitville Mine Site. One hundred fifty copies have been circulated to school official, and interested community members. The video gives an overview of the contamination at the Site, a brief history of the Site, and a "video tour".

1.4 Scope and Role of Interim Remedial Action within Site Strategy

The original mine permitted area included 1,231 acres; the area referred to as the Site is comprised of approximately 550 acres of land disturbed by historic as well as recent mining activities. The most common type of contamination associated with production of a metal mine such as Summitville is the formation and discharge of large volumes of acidic water. The acid generation can occur either chemically or biologically; as part of the living processes of certain microorganisms. The acid is formed chemically when water; such as fall or snowmelt, and air come into contact with metallic sulfide ores. The sulfide (S^{-2}) then reacts to form sulfuric acid and sulfates. The sulfuric acid and sulfates react with the surrounding rock or soils to generate the metal concentrations within the acidic water and is then known as Acid Mine Drainage (AMD). This process continues as long as there is sulfide or sulfates, water, and air.

The primary metallic sulfides and secondary sulfates found at the Summitville Mine Site are pyrite (iron sulfide), alunite (potassium aluminum sulfate), and jarosite (potassium iron sulfate). There are fourteen areas of concern at the Summitville minesite including twelve which either generate or may potentially generate AMD. The fourteen areas are briefly described below in their general order of priority:

1. HELP LEACH PAD (HLP): The HLP is approximately 55 acres in size and 127 feet deep at its lowest point. The Cropsy Creek was diverted around the HLP area and the HLP was then constructed in the former Cropsy Creek drainage bed. The HLP is underlain by a French Drain system and extends onto the toe of the CWP which is located upgradient within the Cropsy Creek drainage bed. The leach pad liner is leaking, causing the water within the French Drain to become contaminated with cyanide. The HLP consists of ore containing high levels of metallic sulfides sitting in a vat of cyanide and heavy metals contaminated water. In December of 1992, the EPA took over operations of the Site water treatment plant to prevent overflow of the contaminated water to the Wightman Fork and, ultimately, the Alamosa River during Spring runoff. Currently the HLP is maintained at a pH of 9 to prevent the evolution of hydrogen cyanide gas. It is currently proposed that the Heap be detoxified as one of four interim actions. This action will also address the potential acidification of the heap once the cyanide is removed and a high pH is no longer maintained. The former continuous overflow of AMD to the HLP from the adjacent CWP is currently being addressed as discussed in 3. below.

2. REYNOLDS ADIT SYSTEM: The Reynolds System is composed of the underground workings which still exist under the large open Mine Pit excavated by SCMCI, and the remaining adits which access those workings. The Adits include the Reynolds, the Dexter Crosscut, the Chandler, and the Iowa. The Reynolds Adit is the main

adit which was driven to drain the workings and provide an access and haulage route. The Dexter Crosscut, a drift branching westward from approximately 100 feet into the Reynolds Adit, also provided drainage, access, and haulage. The Chandler Adit accesses the upper areas of the underground workings at a higher elevation than the Reynolds Adit. The Iowa Adit accesses even higher levels of the workings and areas near the rim of the Mine Pit. The Mine Pit was hydraulically connected to the Reynolds System and contributed much of the AMD observed at the Reynolds Adit. The EPA operated an interim treatment plant to treat the average 120 gallons per minute (gpm) of AMD which exited the Reynolds Adia

Based upon the estimated release of 44.5 percent of total copper loadings directly from the Reynolds Adit, it was determined that plugging of this system be conducted as a time-critical Removal action. A contract to plug the Reynolds Adit System was awarded on October 4, 1993 and work began on November 22, 1993. Adit System extensive technical considerations, only the Reynolds and Chandler Adits were ultimately plugged. The Dexter Adit was found to terminate approximately 450 feet from its intersection with the Reynolds so no plug was needed. Upon completion of the Reynolds plug, there was an immediate decrease in flow and a 65 percent reduction in copper concentrations from the Site overall. Copper loadings directly attributed to the Reynolds Adit were decreased by 97 percent.

On May 25, 1994, the Chandler Adit was discovered to be discharging high volumes of water from porous fractured rock surrounding the plug. The leak was initially estimated at 340 gallons per minute (gpm) and peaked at 725 gpm in June 1994 with high concentrations of metals and low pH. However, this new contaminant source produced less flow and less copper concentrations than experienced from the Reynolds Adit system during the previous year. Work to fortify the Chandler plug was initiated in November 1994 and plug performance will be closely monitored through the 1995 spring runoff season. Since November 20, 1994, AMD exiting the Chandler has been treated through the PITS water treatment plant and no longer discharges directly to Wightman Fork.

3. CROPSY WASTE PILE (CWP): The CWP was composed of approximately 6.5 million tons of low grade ore, overburden, and waste rock excavated from the main Mine Pit during SCMCI's mining operations. The CWP covered approximately 35 acres and was piled as high as 120 feet from the bottom of the old Cropsy Creek drainage bed in which it was placed Although the CWP had been capped to prevent percolation of snowmelt and rainfall, upward infiltration of ground water has begun the process of acidifying the CWP and AMD discharges are occurring. When the HLP was extended onto the toe of the CWP, the French Drain system beneath the CWP was severed from the system below the HLP. As a result, water backed up behind the liner of the HLP into the CWP saturating that part of the CWP and creating a 5 million gallon reservoir of highly contaminated water within the bottom of the CWP.

To prevent the overflow of AMD into the HLP, it was determined that the CWP would be addressed as a non-time-critical Removal action. During development of the EE/CA report, it became apparent that the same response action would also apply to the SDI and BMD, and that concurrent implementation would be cost effective. The response action selected in the Action Memorandum #4 issued by the EPA on September 24, 1993, required consolidation of the various waste piles in the Mine Pits. Because this work would require more than one construction on season to complete, the design and actual construction were phased. Phase I work was initiated on October 1, 1993 and concluded in February 1994. During this time, approximately 927,000 cubic yards of the Cropsy Waste Pile was placed in the Mine Pits. The waste materials were isolated from ground water by lining the surface of the Mine Pits with impermeable material identified on-site. A protective layer of lime kiln dust was placed on the liner prior to placement of the waste materials to neutralize any AMD generated during this work.

Phase II work was initiated in August 1994. The CWP was completed in November 1994 and the SDI/BMD are expected to be completed in December 1994. Phase II will have moved an additional 3.5 million cubic yards of waste material to the Mine Pits.

Phase III work will include construction of a final, impermeable cap and vegetation of the “footprint" areas below the CWP, BMD, and SDI. Since Phase III removal action work had not begun, the EPA evaluated the removal action alternative selected in the action memo as one of its remedial alternatives for the CWP, SDI, BMD, and Mine Pits. This alternative was ultimately selected as the interim response action for these areas of the Site.

4. WIGHTMAN FORK, ALAMOSA RIVER, TERRACE RESERVOIR (OFF-SITE): The release of large quantities of AMD from the Site have occurred since the 1870's when mining first began, though the concentrations have significantly increase since the beginning of mining activities by SCMCI. Much of the AMD generated at the Site finds its way into the Cropsy Creek or Wightman Fork creek, unless it is diverted for treatment. The Cropsy Creek flows into the Wightman Fork at the southeastern comer of the Site. The Wightman Fork, located on the northern boundary of the Site, empties into the Alamosa River approximately 4.5 miles from the Site. The Alamosa, in turn, flows into the Terrace Reservoir about 18 miles from the Site. There are three small wetland habitats along the Alamosa where several endangered species, including the bald eagle, whooping crane, and peregrine falcon have been identified. The closest wetland is 1.8 miles from the Wightman Fork

confluence. The other wetland areas axe 4.2 and nine miles downstream from the confluence. These wetlands are all upstream of the Terrace Reservoir. Concerns regarding other water usage requirements, including drinking water and farm irrigation needs, are being investigated.

5. BEAVER MUD DUMP (BMD): The BMD encompasses 15 acres and consists of approximately 900,000 cubic yards of historic metallic sulfide tailings as well as overburden from SCMCI's operations. It is located immediately adjacent to and south of the Wightman Fork Creek and is a significant source of AMD. The BMD is also infiltrated by ground water and discharges AMD to the SDI. This area is being addressed as part of the CWP Removal action and proposed interim action.

6. SUMMITVILLE DAM IMPOUNDMENT (SDI): Formerly referred to as Cleveland Cliffs Tailings Pond, the SDI is a historic sulfide rich tailings pond located within the former Wightman Fork drainage bed. The Wightman Fork was muted around the impoundment. While the SDI only contains about 133,000 cubic yards of material, it is thought to be hydraulically connected to the Wightman Fork and, therefore, providing AMD directly into the creek. This area is being addressed as part of the CWP Removal action and interim remedial action.

7. FRENCH DRAIN SUM: The French Drain is a collection system which was constructed underneath the CWP and HLP to intercept and route ground water flowing from seeps below these units (CWP and HLP) back into the diverted Cropsy Creek. Because much of this ground water flows through the CWP or becomes contaminated with cyanide when passing below the HLP, it is currently muted to the water treatment systems or pumped directly into the HLP. While the French Drain is not itself a source generating contaminants it serves as a point source discharge for contaminated water in a fashion similar to that of the Reynolds Adit system.

8. CLAY ORE STOCKPILE (Stockpile): The Stockpile is located just north of the CWP and HLP border and was originally meant to be ore for placement on the HLP. Because of its high clay content, SCMCI was unable to provide the special handling needed before the ore could be leached. The one million ton Stockpile was purposely created because of its high content of metallic sulfides and is considered to be a source of AMD.

9. MINE PITS: This is the location of the former orebody mined by SCMCI and the location of the veins that were historically mined within the Summitville mining district. The 100-acre Mine Pit has consumed most of the underground mine workings with the exception of the Reynolds Adit System described above. This area was and is highly mineralized and contains high concentrations of metallic sulfides. Approximately 70 million gallons of water (snow or rain) per year entered the Pit, passed through the remaining underground workings, and exited as AMI) from the Reynolds Adit, prior to plugging. The Pit is the origin of the rock in each of the tailings areas on-site and the ore in the HLP. This area is being addressed as part of the CWP Removal Action and interim action At this time, the Pit has been filled by the waste material and is free draining of surface water.

10. THE NORTH WASTE DUMP (DUMP): This refers to a large area located north of the Pit composed of waste rock and overburden from the Mine Pit. It contains relatively moderate amounts of metallic sulfides and is a potential source of AMD. The northern portion of the dump, primarily the slope below the 11,580 bench, was reclaimed and upper portions of the dump were regraded with some subsoil and topsoil placement during the 1991 operational season Vegetation success has been limited due to high wind exposure.

11. GOMPERTS PONDS: These are a series of small ponds, located approximately 400 feet north of the HLP, that contained severely acidic and toxic metals contaminated water and sludges. The ponds were excavated and then covered with soils. It is unknown if any sludges or contaminated soils remain where the ponds were. If so, this area is another source of AMD.

12. ACID ROCK DRAINAGE SEEPS: There are over 48 potential acid rock drainage seeps identified on the Site. These are areas where ground water namely comes to the surface though some may be a result of construction activities at the Site. The seeps have not yet been evaluated to determine if they are an AMD source.

13. MINE SITE ROADS: Many of the roads at the Site were constructed with waste rock from the Mine Pit. The material in these roads has not yet been evaluated to determine if they are an AMD source.

14. LAND APPLICATION AREAS: There are areas where cyanide contaminated AM was sprayed onto the soils as a treatment method. Aeration, as a result of spraying, was meant to eliminate the cyanide contamination while the soils were supposed to attenuate the metals. These areas have not yet been evaluated to determine if they are a current AMID source.

Once these areas had been identified, the EPA was able to establish Remedial Action Objectives (RAOs) for the overall Site. Pursuant to 40 CFR section 300.43 (e)(2)(i), the RAOs were established to provide remedial goals for the Site and were developed in consideration of current regulatory. guidelines, compliance with ARARs, and other identified limiting factors. The sitewide RAOs for the Summitville minesite are:

1. Reduce or eliminate deleterious quality water flow from the Summitville minesite into the Wightman Fork.

2. Reduce or eliminate the need for continued expenditures in water treatment for the Summitville minesite.

3. Reduce or eliminate the acid mine/rock drainage from the manmade sources on the Summitville minesite.

4. Reduce or eliminate any human health or adverse environmental effects from mining operations downstream from the Site, to include the Alamosa River.

5. Encourage early action and acceleration of the Superfund process for the Summitville Site.

An analysis of metal loadings attributable to each of the AMD source areas resulted in the development of five primary areas of focus. Many of these source areas are in drainages or are located where large amounts of surface or ground water axe available for continued generation of AMD. The Cropsy-Wightman stream drainage system for the Site also serves as a way to transport the generated AMD contaminants off-site. The following table illustrates the copper loadings and flows from these drainage points as measured by SCMCI in July of 1991. This approach is also based on the water quality data regarding copper loading into Wightman Fork. The table lists the contaminant sources, the yearly copper contribution to the creek from each source, and the relative percentage loading of each source:

SOURCE	POUNDS OF COPPER PER YEAR	RELATIVE PERCENT
Reynolds Adit	143,000	44.6
Cropsy Waste Pile	33,400	10.4
Heap Leach Pad		
overflow potential	84,000	26.2
French Drain	14,600	4.5
Summitville Dam Impoundment/ Beaver Mud Dump	17,000	5.3
Other	29,000	9.0
TOTAL	321,000	100.0

Due to the size of the Site and extent of the contamination, the sitewide interim remediation activities are being addressed in five separate, though related actions. These five actions are:

- Plugging the Reynolds and Chandler Adits
- Movement of the CWP, SDL and BMD
- HLP Detoxification/Closure
- Sitewide Reclamation
- Interim Water Treatment

The first action of the containment/isolation and stabilization project was the plugging of the Reynolds and Chandler Adits. The second action is excavation of the CWP, SDI, and BMD, with subsequent placement of this material into the Mine Pits. Both of these removal actions are in progress under Emergency Response authority as discussed above.

The Phase III work for CWP, SDI, and BMD, as well as the remaining three actions will be completed as interim remedial actions. The CWP, HLP, and Reclamation work are expected begin during the 1995 construction season. The Water Treatment action will continue without interruption though modifications in actual treatment processes may be implemented during 1995.

This IROD addresses the reduction or elimination of dissolved metal contaminants and the transportation of metal contaminants in surface water from the Site. This interim remedial action is targeted to mitigate sources of AMD generated at the CWP, BMD, SDI and Mine Pits. The remediation measures described in this IROD are a continuation to the substantial cleanup measures undertaken by EPA using Emergency Response Removal Authorities at the CWP, BMD, SDI and Mine Pits. The Emergency Responses were taken by EPA to quickly minimize potential impacts to downgradient receptors. These actions have included the removal of materials from the CWP, BMD, SDI, placement of waste materials into the Mine Pits and plugging of the Reynolds and Chandler Adits. This interim remedial action is intended to complete the clean up of the CWP, BMD, SDI and

Mine Pits initiated by EPA under its removal authorities.

1.4.1 Remedial Action Objectives and Goals

Specific remedial objectives for the CWP, BMD, SDI and Mine Pits are confined to removal, containment or treatment of contaminated materials and drainage and the elimination or reduction of AMD. Remedial actions will be implemented in order to eliminate or minimize metal transport to the Wightman Fork and the Alamosa River. It is expected that the impacts of transport will be monitored in the Alamosa River below the confluence with Wightman Fork. The interim RAOs and goals for CWP are as follows:

1. Reduce and/or eliminate acid rock drainage and metals released from the CWP Drainage.

2. Ensure compatibility with the sitewide remedy.

3. Remove, reduce, stabilize and/or contain significant manmade sources of acid rock drainage to prevent further release.

4. Divert water from flowing into the HLP, thereby reducing treatment costs.

5. Separate or eliminate the CWP drainage impact, (including volume and quality of water) on structural integrity of the valley drainage system (e.g., dikes, waters diverting from outside the French Drain underneath the HLP).

6. Implement pre/post monitoring programs at the CWP and at subsequent compliance points.

The interim RAOs and goals for BMD and SDI are as follows:

1. Ensure compatibility with the sitewide remedy.

2. Remove, reduce, stabilize and/or contain significant manmade sources of acid rock drainage to prevent further release.

3. Implement pre/post monitoring programs at the BMD, SDI and at subsequent compliance points.

4. Reduce and/or eliminate acid rock drainage and metals released from the BMD and SDI area.

The interim RAOs and goals for Mine Pits are as follows::

1. Ensure compatibility with the sitewide remedy.

2. Remove, reduce, stabilize and/or contain significant manmade sources of acid rock drainage to prevent further release.

3. Implement pre/post monitoring programs at the Mine Pits and at subsequent compliance points.

4. Reduce drainage into the Mine Pits and the consequent AMD loading at the Reynolds Adit.

1.4.2 Removal Actions

A non-time critical Removal action was initiated for the CWP, BMD, SDI and the Mine Pits in October 1993. Due to the short construction season associated with the high elevation of the Summitville Mine Superfund Site, this response action was designed and was to be implemented as three separate phases, each phase to be completed during a single construction season. These response action will reduce AMD from the Site by an estimated 140 million gallons per year.

Phase 1 was initiated in October 1993. During Phase I, approximately 927,000 cubic yards of waste material from the Cropsy Waste Pile were excavated and placed into the Mine Pits. The Mine Pits were previously lined with clay, and lime kiln dust was placed on top of the clay liner.

Phase II was initiated in August 1994 as a continuation of the non-time critical removal action. Phase II is scheduled to be completed in July 1995. Work to be completed during Phase II includes the excavation of 2.5 million cubic yards of waste metals from the CWP, excavation of 1.5 million cubic yards of material from the BMD, and removal of waste material from the SDI, and placement of the waste material into the Mine Pits.

Phase III, which incorporates a final cap of the Mine Pits and revegetation of the areas exposed from the removal of wastes from the CWP, BMD, and SDI will be initiated in 1995, as part of this interim remedial action.

1.4.3 Ongoing Actions

At the present time, water collected from the AMD reservoir impounded beneath the CWP, and the French Drain Sump is currently being treated by the Cropsy Water Treatment Plan (CWTP). EPA continues to treat water recirculated through the HLP and the French Drain Sump at the Cyanide Destruct Plant (CDP) and the Metals Removal Plan (MRP).

EPA is providing the following actions to continue the water treatment operations:

- Maintenance of access roads
- Snow removal
- Site security

1.5 Site Characteristics

1.5.1 Nature and Extent of Contamination

The EPA (1992) identified the Contaminants of Potential Concern (COPC) based on elevated concentration and potential toxicity of mobilized chemicals. The COPC will be finalized upon completion of the Baseline Risk Assessment. These concentrations were compared to Site-specific background levels, which were determined by standard statistical analysis (Morrison Knudsen Corp., 1994). Potential adverse effects on human health and the environment, including affected wildlife, were preliminarily assessed (EPA, 1992). The COPC identified for the Site are copper, cadmium, chromium VI, lead, silver, zinc, arsenic, aluminum, iron, mercury, manganese, and cyanide.

All of these contaminants, except cyanide, are found at the Site in naturally occurring minerals and compounds. They are made soluble during the AMD-generating chemical process. The AMD process is accelerated by the mining activities which took place at the Site.

<u>1.5.1.1 Acid Mine Drainage</u>

At Summitville, mining activities resulted in additional sulfidic material surface area available for contact with oxygen and water. Air and water contact with the additional surface area provided by broken rock accelerates oxidation of minerals and creation of low pH drainage. This drainage water is high in acidity, sulfate (SO4) ions and dissolved metals.

AMD water contributes metal loads to Wightman Fork and Alamosa River. This creates adverse conditions preventing the growth and maintenance of a healthy aquatic ecosystem. These adverse effects have been noted in various studies of water quality of Wightman Fork and the Alamosa River.

<u>1.5.1.2 Water Containing Cyanide</u>

Commercially manufactured sodium cyanide (NaCN) was used at the Site for extracting precious metals from ore grade materials. Cyanide has been used for this purpose in the mining industry since the late 1800's. Cyanide is found either in simple form or in combination with other elements. Simple cyanide forms designated as "free" cyanide are the cyanide radical, CN, and hydrogen cyanide, HCN. Cyanide also combines or complexes with alkali metal ions, heavy metal ions, and transition elements. The complex cyanide bonding is very strong, moderately strong, or weak (defined by tendency to disassociate in an acidic environment). Presence of excess hydrogen ions (acid) will lead to the formation of HCN, depending on the strength of the metal/cyanide bond.

Cyanide content is found in residual process water contained in the HLP. The predominant form of cyanide in solution is a Weak Acid Dissociable (WAD) complex (complex that has a moderately strong bond and dissociates at a pH of 4.5 or greater) with copper. Complexes with other elements - silver, sulfur, gold, iron and others - are also present. Thiocyanate (SCN) is present in significant quantifies. The thiocyanates may migrate through the water treatment train into Wightman Fork. The pH of contained residual process water within the HLP averages about 9.3

Leaks in the HLP containment liner result in the presence of cyanide in drainage that surfaces downgradient of the HLP. These drainage streams from the Valley Center Drain (VCD), and several seeps in and below HLP Dike 1 are mixtures of residual process water, AMD, and ground water. The AMD portion results in low pH (2.5 - 3.5), and cyanide exists as either a metal/cyanide complex (primarily with copper), or as free cyanide (HCN). These streams are routed to the French Drain Sump to prevent release to Wightman Fork and Alamosa River drainages. The water is pumped to the HLP and mixed with residual process water, or treated separately.

1.5.2 Description of Impacted Water

Tables 2 - 7 summarize data collected during water monitoring before treatment and during discharge of surface water to Wightman Fork. The tables include recordings of copper and cyanide loadings from May 1993 through June 1994. During this period, monitoring emphasis was given to copper and cyanide became these were the chemicals of highest concentration during the ERRA. There was also a concern became of the potential toxicity of cyanide.

Table 8 shows data representing the copper load (lbs.) transported by the Site water. The first group exhibits copper load from water pumped from the French Drain (FD) Sump. The FD sump contains water from the VCD and AMD seeps.

The second data group within illustrates the copper concentration of water contained in the HLP. This includes water pumped from the FD Sump, water that surfaced at the toe of the CWP, and process water contained in the HLP. All water in the HLP is treated to remove cyanide and copper, as well as other metals, before release to Wightman Fork.

The underground workings section presents data on copper load that was transported by water exiting from the Reynolds Adit and the Chandler Adit. Also shown is the amount of copper removed through treatment at the Portable Interim Treatment System (PITS). The PITS treated water exiting the Reynolds Adit, the Iowa Adit, and some contaminant surface runoff. The plant was deactivated alter the Reynolds Adit plug was completed.

The remaining sections of the table present the copper content of surface water discharged into Wightman Fork during this time period. These include water from Cropsy Creek, seep LPD-2 (which feeds into Cropsy Creek), and Pond P-4 (a sediment pond that receives surface runoff from the mine pit area, haul roads, and other runoff). Other streams that contributed copper load to Wightman Fork include drainage from the SDI, the NPWD, the Clay Ore Stockpile, and treatment plant effluent.

Also shown are the pounds of copper that would have been added to Wightman Fork if water had flowed into Wightmart without treatment Annual totals from July 1993 to June 1994 are given to the fight of monthly totals. The twelve month period, July 1993 through June 1994, represents the time frame when existing treatment facilities utilized maximum capacity.

Table 2 shows monitored cyanide loading (lbs.) or the potential for cyanide loading to Wightman Fork during the same period.

Table 3a shows monitored flow rate for streams which are capable of carrying contaminant load to Wightman Fork, High and low flow rates illustrate seasonal fluctuations. Combined monthly totals illustrate potentially required treatment volumes.

Table 3b shows the total gallons for streams capable of carrying contaminant load to Wightman Fork This table also shows the annual plant capacity measured in total gallons.

Table 4 shows other monitored contaminants (manganese and iron) that should be taken into consideration in the selection of treatment processes. Manganese removal to <1 mg/liter is necessary before cyanide destruction can take place. Significant iron content can produce sludge volumes that affect plant efficiency.

Tables 6 and 7 show copper and cyanide concentrations monitored at station WF 5.5 on Wightman Fork from May 1993 through June 1994.

General descriptions of monitored surface water affected by conditions at the Site are given below. Figure 4 shows contaminated surface water streams.

Stream A - The Valley Center Drain (VCD)

General: Comprised of drainage from the CWP, ground water from beneath the HLP, and leakage from HLP containment. Contains cyanide as a result of leakage from the HLP. CWP drainage contributes low pH and elevated metals.

Volume: Significant flow throughout the year. Peak flow is concurrent with spring snowmelt. High flow (78 gpm)recorded in April 1994; low flow (57 gpm) was recorded in June 1993.

Loading: Based on copper as the indicator, the VCD ranked as the 4th highest peak flow carrier of metals. 8,473 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream B - Cropsy Waste Pile Drainage

General: Comprised of ground water flow from seeps and upgradient drainage through colluvium and alluvium (Geraghty & Miller, 1992). Includes precipitation (snowmelt and rain fall) infiltrating through mine waste materials. Significant aluminum content effects must be considered when selecting a treatment process. Volume and makeup are expected to materially change with planned relocation of CWP materials.

Volume: Seasonal release to the surface at the toe of the CWP. Year round contribution to the VCD. High flow (364 gpm) recorded in May 1993. Surface flow was not observed at the toe of the CWP between January - April 1994.

Loading: Based on copper as the indicator, water surfacing at the toe of the CWP is the second highest peak carrier of metals. 23,305 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994 (includes water sent to the CWTP).

Stream C - Drainage from Underground Workings

General: Comprised of ground water and precipitation (snowmelt and rainfall) infiltrating the mine pit area. These infiltrating waters draining through mineralization rock into the remaining underground workings have historically surfaced as flow from the Reynolds Adit Comparatively less water volume drains from the Iowa Adit. The Reynolds and Chandler adits have been plugged. The long-term effects of plugging the Reynolds Adit in February 1994 and Chandler Adit in March 1994, and the consequent rise in the South Mountain water table have not been determined. In May 1994, an AMD stream developed as discharge from the Chandler Adit. It has been observed that the water is flowing between the top of the plug and the roof of the adit (Abel, pers. comm., 1994). Peak flow from the Chandler Adit leak in June 1994 was 661 gpm with a copper concentration of 409.40 mg/l and a pH of 2.16, determined by sampling the stream just outside the adit entrance. This was almost "instantaneous" (the discharge increased from 0 gpm to 661 gpm in 11 days), indicating a direct relationship between the rise in the South Mountain water table and the filling of the adit system with water. By the end of July 1994, the flow of the AMD stream decreased to 130 gpm with a copper content of 268 mg/l and a pH of 2.30. Eventual volume of AMD that may require treatment is unknown. Corrective measures are planned.

Volume: Significant flow throughout the year. High flow from the Reynolds Adit (763 gpm) was recorded in June 1993; low flow from the Reynolds Adit (6 gpm) was recorded in April 1994.

Loading: Based on copper as the indicator, Stream C is ranked as the highest peak flow carrier of metals. 198,221 pounds of copper dissolved in solution were transported by drainage from July 1993 through June 1994. Peak flow of AMD from the underground workings in June 1994 was 14% less than flow in June 1993. Copper load from underground workings in June 1994 was approximately 23% less than the load in June 1993. In July 1994 volume from the underground workings was 25% less than in July 1993. Copper load from underground workings in July 1994 was 15% less than in July 1993.

Stream D - Summitville Dam Impoundment and Beaver Mud Dump Drainage

General: Comprised of the surface drainage into the impoundment and surrounding area and the ground water migration through the mud dump. Possible ground water migration through tailings contained in the pond. Includes precipitation (snowmelt and rainfall) infiltrating through BMD materials. Volume and makeup of this stream is expected to materially change with planned solid waste relocation in 1994-95 (Cropsy Phase II operations).

Volume: High flow (202 gpm) was recorded in May 1993; low flow (33 gpm) was recorded in November 1993. Monitoring was not possible from January 1994 through April 1994, due to snowpack.

Loading: Based on copper as the indicator, Stream D is ranked as the third highest peak flow carrier of metals. 12,294 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream E - North Pit Waste Dump drainage

General: Comprised primarily of surface runoff from waste dump materials. There is some ground water seepage.

Volume: Significantly varies with precipitation (rainfall and snowmelt). Affected by spring runoff. High flow (284 gpm) was recorded in May 1993; low flow (1 gpm) was recorded in October 1993. Monitoring was not possible from November 1993 through April 1994, due to snowpack.

Loading: Based on copper as the indicator, Stream E is ranked as the 6th highest peak flow carrier of metals. 4,321 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream F - Clay Ore Stockpile Drainage

General: Comprised of surface drainage migration through lower portions of the waste dump and precipitation (snowmelt and rainfall) infiltrating through upper level materials. Water migrating from beneath the CWP may also contribute.

Volume: High flow (66 gpm) was recorded in June 1993; low flow (37 gpm) was recorded in May 1994.

Loading: Based on copper as the indicator, Stream F is ranked as the 8th highest peak flow carrier of metals. 1,113 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream G - Sediment pond P-4 drainage

General: Comprised of surface drainage from upgradient disturbed areas. Includes some contribution from Iowa adit drainage.

Volume: Highly variable, dependent on precipitation events. High flow (948 gpm) was recorded in May 1994; low flow (4 gpm) was recorded in November 1993.

Loading: Based on copper as the indicator, Stream G is ranked as the 5th highest peak flow carrier of metals. 4,508 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream H - Drainage from Cropsy Creek

General: Comprised of surface drainage from upgradient disturbed areas. Rerouted around the CWP and HLP areas during SCMCI operations. Receives some metals loading from surface runoff from the Cropsy Waste Pile and seep LPD-2, downgradient from the HLP and Dike 1. May receive loadings from effected ground water. Route does not go through sediment control fro.

Volume: Peak flow is concurrent with spring runoff. Significantly affected by precipitation (snowmelt and rainfall). High flow was recorded in May 1993; low flow was recorded in February 1994.

Loading: Based on copper as the indicator, Stream H is ranked as the 7th highest peak flow carrier of metals. 1,737 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

The affected stream segments are summarized in the following Table. The streams are ranked in decreasing order according to the metal load during peak flow.

Ranking of Surface Water Streams at Peak Flow
without Operation of CWTP, CDP and MRP

Metal Load at Peak Flow*	Stream**
1	Stream C- Underground Workings Drainage
2	Stream B- CWP Drainage
3	Stream D- SDI/BMD Drainage
4	Stream A- VCD
5	Stream G- P-4 Drainage
6	Stream E- NPWD Drainage
7	Stream H- Cropsy Creek Drainage
8	Stream F- Clay Ore Stockpile Drainage

* Rankings are listed in decreasing order.
** Table does not include the HLP wastewater stream.

French Drain Sump Inflows

The FD Sump was originally constructed to prevent drainage from the VCD (Stream A) from entering the Cropsy Creek and Wightman Fork. A collection and pumping facility was installed after VCD drainage was found to contain cyanide. The sump was also utilized to contain other contaminated water. These drainages (described below) were found to be contaminated in later years. Tables 1 - 3b summarize data for copper, cyanide, and water volume for these streams. General descriptions follow.

FD Sump -1 Seepage from Dike 1

General: Comprised of water exiting a point at the base of Dike 1.

Volume: Peak volume (1,785,600 gal., June 1993) is concurrent with spring snowmelt

Loading: At peak flow, Stream FD Sump-1 transports up to 83 lbs of copper per day. Load declines to less than 3 lbs per day as flow decreases.

FD Sump -2 Seepage from the Dike 1 ramp

General: Comprised of water exiting a point on the access road that flanks Dike 1.

Volume: Peak volume (820,000 gal. in June 1993) is concurrent with spring snowmelt. Flow ceases soon after the peak snowmelt period. Water is acidic, and contains cyanide.

Loading: At peak flow, Stream FD Sump-2 transports up to 5.7 lbs of copper per day. Load declines to less than 1 lb. per day as flow decreases.

FD Sump -3 Drainage from beneath the HLP

General: Comprised of water exiting rock drains built to divert water during HLP construction at 11,510 and 11,530 elevations. Discharges are combined and routed to the FD Sump. There is a wide range in copper content Contains a slight amount (0.12 mg/l) of cyanide at peak volume discharge.

Volume: Peak volume (1,116,000 gal. in June, 1993) is concurrent with spring snowmelt Significant flow continues throughout the year.

Loading: At peak flow, Stream FD Sump-3 transports up to 27 lbs of copper per day. Load declines to less than 1 lb. per day as flow decreases.

1.5.3 Contaminant Transport and Migration

1.5.3.1 Surface Water

Surface water is considered the most significant media for off-site transport of metals. Surface water has been impacted by mining operations from the Site throughout the reach of Wightman Fork, from the Site to the Alamosa River, and within the Alamosa River from Wightman Fork to Terrace Reservoir and points further downstream. According to the Conceptual Sitewide Remediation Plan prepared for the EPA, it has been determined that the Site is the predominant source of metals loading to the Alamosa River system.

As pH of water rises from the addition of water with higher pH, iron precipitates from solution as a hydrated iron (mr) oxide product (ferric hydroxide). This forms the red or yellow staining seen on rocks in the streams or on banks. Copper, cadmium and and will co-precipitate with iron precipitates. Metals concentrations are further reduced by dilution from downstream tributaries. COPC could be biologically transported through an aquatic food chain, and could be transported to birds, animals and humans. The Baseline Risk Assessment (BRA) has not been completed; however, qualitative risk analysis has been performed by EPA which verifies this data (ERT, 1993). The BRA is scheduled for completion in 1995. Currently, the full range of COPC's is being reassessed and additional contaminants of concern (COC) may be identified in the BRA.

1.5.3.2 Ground water

Ground water depths vary at the Site. In general, water levels are relatively close to the surface except in the vicinity of the old mine workings where depth to water can be as much as 300 feet.

The old workings act as effective underdrains. Ground water and precipitation infiltrating through the Mine Pits pass through mineralized rock and into the underground workings. This water has historically surfaced as AMD at the Reynolds Adit. It is anticipated that the ground water level will rise as water backs up behind the plugged Reynolds and Chandler Adits.

The ground water occurs in surficial deposits consisting of colluvium, alluvium, and/or glacial moraine; and fractured andesite of the Summitville Formation. Ground-water flow is within the weathered and fractured bedrock and, within alluvium near the Cropsy Creek and Wightman Fork channels. Ground-water flow and metals are capable of being transmitted to Wightman Fork through the alluvial and bedrock systems. Ground water is generally shallow (02. to 25 feet within the alluvium) and flows northeast in both the Cropsy and Wightman Fork drainages. Tile CWP and BMI) were placed on springs and seeps in these drainages.

This underground flow is the primary source of water that generates AMD from the CWP and BMD.

Shallow ground water at the Site is present as a series of intermittent, perched systems. The perched aquifer system contributes to recharge of the shallow fractured bedrock system. No regional ground-water table has been identified at the Site. The ground water close to the surface is strongly influenced by precipitation. During spring runoff, these shallow systems discharge to surface water. Numerous springs and seeps are evident throughout the Site and most flow in direct response to precipitation.

1.5.3.3 Soil and Air

Site cover consists of topsoil, silt, clays, and gravel. The topsoil is described as grey/brown/orange, non-plastic with a trace of roots and sand. The clays are low to medium plasticity with some gravel. The gravel is indicative of colluvial deposits or tailings. The disruption of the surface soils may be a secondary source of excess metals migration.

1.5.4 ARARs

ARARs are "applicable" or "relevant and appropriate" requirements of federal or state law which address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA Site. Refer to Table 7 for a detailed summary and discussion of ARARs. The NCP defines "applicable" requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action location or other circumstance found at a CERCLA site. "Relevant and appropriate" requirements address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the environmental or technical factors at a particular site. (See 40 CFR Section 300.5.)

ARARs are grouped into three categories:

- Chemical Specific
- Action Specific
- Location Specific

Chemical specific AR include health or risk based narrative standards, numerical values, or methodologies that, when applied to site-specific conditions establish the acceptable amount or concentration of a chemical that may remain or can be released to the environment. Action specific ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous substances found at CERCLA sites. Location specific are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations. Examples of special locations include floodplains, wetlands, historic places and sensitive ecosystems or habitats. (See "CERCLA Compliance with Other Laws Manual Draft Guidance," EPA/540/G-89/006 August 1988.)

In addition, the NCP has identified a fourth category of information "to be considered" when evaluating remedial alternatives, known as TBC. TBC represent Federal and State advisories, criteria or guidance that are not ARARs, but are useful in developing CERCLA remedies. (See 40 CFR 300.430(g)(3).)

The analysis of ARARs has been limited to the scope of the interim action. The NCP allows waiver of ARARs for interim remedial measures that do not exacerbate site problems or interfere with final remedy (40 CFR 300.430(f)(1)(ii)(c)(1) and 55 FR 8747). Other ARARs may be involved in enacting final remedy(ies).

The sitewide ARARs were identified in the addendum to the HLP FFSs. However, in response to comments submitted during the public participation process on the CWP FFS and Proposed Plan, EPA is further defining the ARARs from Federal and State laws or regulations which must be met by any alternative implemented as the CWP interim remedial action. Since the sitewide ARARs have already been identified in the "ARARs Addendum to the HLP Focused Feasibility Study Report", this further refinement of ARARs as they relate to the CWP IROD represents only a minor change to the CWP FFS and Proposed plan. Consistent with its "Interim Final Guidance on Preparing Superfund Decision Documents", OSWER Directive 9355.3-02 (June 1989), EPA has determined that this minor change will have little or no impact on the overall scope, performance, or cost of each alternative as originally presented in the CWP FFS or Proposed Plan.

The following sitewide ARARs, or relevant portions of the sitewide ARARs, must be met in accordance with Section 121(e) of CERCLA and 40 C.F.R. 300.430 of the NCP by each potential CWP interim remedial action alternative:

1.5.4.1 Chemical Specific

Sure Water ARARs

The Colorado Water Quality Standards (CWQS) establish a system for classifying state surface waters and procedures and criteria for assigning numeric water quality standards. (See 5 CCR 1002-8, Sections 3.1.0 through 3.1.17.)

- Colorado Water Quality Standards, Applicable Criteria for Stream Classification

The CWQS require that surface waters be:

> classified for the present beneficial uses of the water, or the beneficial uses that may be reasonably expected in the future for which the water is suitable in its present condition or the beneficial uses for which it is to become suitable as a goal .... Where the use classification is based upon a future use for which the waters are to become suitable, the numeric standards assigned to such waters to protect the use classification may require a temporary modification to the underlying numeric standard... (See § 3.1.6.)

The CWQS employ four broad types of beneficial use to frame the classification process:

- recreational
- aquatic life
- agriculture
- domestic water supply

Recreational Use

The recreational uses are divided into two classifications. Recreational Use, Class 1 - Primary Contact, addresses surface water quality concerns where ingestion of small quantities of water during the use is likely to occur. Recreational Use, Class 2 - Secondary Contact, focuses on streamside activities where ingestion of water is unlikely to occur. The effect of the recreation classification on numeric water quality criteria is limited, the primary consideration being the concentration of fecal coliform bacteria. The Summitville Minesite is unlikely to contribute bacterial contamination to the watershed. For that reason, the recreational use classifications will not be considered further.

Aquatic Life

Two aquatic life classifications are currently promulgated for stream segments of interest Class 1 cold water aquatic life is defined as:

> ... waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species. (See §3.1.13(1)(c)(i).)

Class 2 cold and warm water aquatic life is defined as:

> ... waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species. (See §3.1.13 (1)(c)(iii).)

Domestic Water Supply

Domestic water supply is defied as:

> ... suitable or intended to become suitable for potable water supplies. After receiving standard treatment ... these waters will meet Colorado drinking water regulations... (See §3.1.13(1)(d), emphasis added.)

Agricultural Use

Agricultural use as defined:

> ... suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock... (See §3.1.13(1)(b).)

Three segments of the Alamosa River are classified for various uses according to this system: Segment 6, the Wightman Fork at and below the mine; Segment 3b, the Alamosa River from immediately above the confluence with Wightman Fork to Terrace Reservoir; and Segment 8, Terrace Reservoir. Figure 5 shows segments of the Alamosa River Basin.

Segment 6 is classified for Class 2 and Agriculture. It is not classified for aquatic life. No numeric water quality standards have been assigned. The lack of an aquatic life classification was derived by the use attainability analysis performed by the Colorado Water Quality Control Commission (WQCC). The WQCC determined that all aquatic life classification cannot be attained within 20 years.

Segment 3b is classified as Class 1 Cold Water Aquatic Life. Numeric Standards are set for surface water downstream of the confluence of Wightman Fork and the Alamosa River.

Terrace Reservoir is classified as Class 2 Cold Water Aquatic Life. This classification recognizes a limit on the ability of Terrace Reservoir to sustain a diverse aquatic community.

Numeric Water Quality Standards

The CWQS provides a three-tiered structure for establishing numeric water quality standards. For unimpacted high quality waters, numeric levels known as the "Table Value Standards" (TVS) are established and presumed to be protective. For impacted waters where pollutant concentrations exceed TVS values but the beneficial uses are adequately protected, Ambient Quality-Based Standards can be adopted. For impacted waters where beneficial uses are not currently adequately protected, TVS are adopted as a goal. Temporary modifications to numeric standards may be adopted in these areas. Where classified uses are not being protected and a use attainability analysis has found nonattainability, Site-Specific-Criteria-Based Standards can be developed. The TVS and Ambient Quality-Based Standards are applicable regulations for determining compliance with surface water discharges at the Site. Segment 3b of the Alamosa River is downstream of the Site at the confluence of the Wightman Fork and the Alamosa River. These regulations were used to establish promulgated standards in this segment of the Alamosa River. Specifically, the Classifications and Numeric Standards for Rio Grande Basin are found in Section 3.6.6. of the regulation. Table 8 illustrates these levels. These standards are categorized into acute and chronic limits. Acute limits represent an upper level not to be exceeded in any 24 hour period. Chronic standards are average levels which can not be exceeded in a 30 day period.

Table Value Standards

The TVS are based upon the Federal Water Quality Criteria. The TVS, however, have been adjusted to protect the beneficial uses of Colorado waters (See §3.1.7(b)(i).) The TVS for aluminum (acute), arsenic (acute), lead (acute/chronic), nickel (acute/chronic), selenium (acute/chronic), silver (acute/chronic), zinc (acute/chronic), chromium VI (acute/chronic), chromium III (acute), mercury (chronic), manganese (chronic), cadmium (acute/chronic), pH dissolved oxygen, Fecal Coli ammonia, chlorine, sulfide, boron; nitrate and cyanide are set at Segment 3b. It is important to note that many of the TVS for protection of aquatic life from metal pollutants are hardness dependent. The WQCC has adopted an acute and a chronic copper standard for Segment 3b. The acute copper standard for Segment 3b is established using the TVS; however, the WQCC has adopted a less stringent temporary modification to this standard based upon WQCC hearing testimony. The EPA has adopted and will meet the ambient quality based chronic copper standard as applicable for this interim action and is not using the less stringent acute copper standards from the TVS or the less stringent August 1994 temporary modification. The IAL, as monitored at WF-5.5, were developed to meet the more stringent ambient quality-based chronic copper standard at Segment 3b.

Ambient Quality-based Standards

Ambient quality-based numeric surface water quality standards are the mechanism where limited water quality impacts are controlled through less stringent water quality standards. Ambient quality-based standards are specify intended to address circumstances where natural or irreversible man-induced ambient water quality levels are higher than the specific numeric levels contained in the TVS Tables I, II, and III, but are determined "adequate to protect classified uses." (See § 3.1.7(1)(b)(ii).) The chronic standard for copper is established at Segment 3b using this regulation. Copper is one of the primary contaminants of concern for water quality. The chronic cope standard was used as the most strict ARAR for copper at the Site. The IALs were developed using this standard. The chronic standard for iron also falls into ambient water quality standards. There are no acute iron standards.

To evaluate the ability of alternatives to meet the stream classification and numerical standard of the CWQS ARARs, EPA established interim action levels (IAL) for water quality. These IAL can be found at page 23 of the Water Treatment FFS. The IAL are developed using a model which utilized high flow and low flow average concentration of the contaminants to set threshold loadings allowable at Wightman Fork monitoring point 5.5. Numerical standards that would enable the river water quality to meet the water quality ARAR at Segment 3b under average conditions were then calculated. Based upon the WQCC numeric water quality standards for Segment 3b, the TVS levels were used for all COPC at the Site with the exception of copper and iron EPA used the WQCC ambient quality standard for copper and iron. The ambient level for copper is 30 ug/l based upon the 85th percentile ambient data in Segment 3a. The methodology used to develop these levels is similar to the criteria applied in the development of the Numeric Criteria Levels (NCL), that is, back modeling the contaminant loading from the promulgated ARARs at the Alamosa River. These IAL are formally adopted as remedial goals in the IRODs.

The discharge monitoring point, WF-5.5, is the interim monitoring point for the Site, and the IAL are the interim water quality standards during this remedial action five year period. It is important to note that the IALs are not "interim" due to their inability meet ARARs; rather, EPA believes that these ARARs-derived limits at the point of compliance do attain the numerical standards at Segment 3b. The ability of the IAL to achieve the applicable water quality standards, however, will be by EPA upon the completion of the quantified Risk Assessment and the State of Colorado use-attainability study. The results of these efforts will be incorporated into a final remedy.

- Federal Water Quality Criteria, Applicable

The preamble to the proposed NCP states:

> (a) State numerical WQS is essentially a site-specific adaptation of a Federal Water Quality Criteria (FWQC), subject to EPA approval, and, when available, is generally the appropriate standard for the specific body of water." (See 53 FR 51442, right column, top.)

As noted above, the FWQC would only be applicable in the absence of current, segment specific CWQS. In this circumstance, current, segment specific CWQS are available and will be applied as the surface water quality ARARs for the Site. The FWQC are considered applicable since this establishes the basis for the State of Colorado's numerical standards.

Ground Water

The Colorado Ground Water Standards (CGWSs) provide for identification of specified ground water areas, classification of the specified areas, and numeric ground water quality standards.

5 CCR 1002-8 establishes a system for classifying ground water and adjusting water quality standards to protect existing and potential beneficial uses. The ground water classifications are applied to "specified areas," a concept identified in the definitions and explained in Section 3,11.4(C)(1). Those ground waters not classified as within "specified areas" may be subject to Statewide radioactive material standards listed in Section 3.11.5(C)(2) of the Basic Standards of Ground Water, 3.11.0 (5 CCK 1002-8) and organic standards identified in Table A of Section 3.11.5(C).

Since the Colorado Water Quality Commission has yet to classify the Site as a "specified area," there are no currently applicable or relevant and appropriate Colorado Ground Water numeric standards for the Site. However, since the publication of the WTFFS, the Colorado Water Quality Control Commission has adopted an interim narrative standards for all unclassified ground waters of the State that supplements the Statewide Standards for radioactive materials and organic pollutants established in Section 3.11.5(C) of the Basic Standards for Ground Water. This narrative standard requires that ground water quality be maintained for each parameter at whichever of the following levels is less restrictive:

> (i) existing ambient water quality as of January 31, 1994, or
>
> (ii) that quality which meets the most stringent criteria set forth in Tables 1 through 4 of "The Basic Standards for Ground Water."

Ambient water quality is established by agencies "with authority to implement thin standard" using "their best professional judgment as to what constitutes adequate information to determine or estimate existing ambient quality, taking into account the location, sampling date, and quality of all data available" prior to January 31, 1994. Based on Rule 1, Section 1.1(5) of the Mineral Rules and Regulations, EPA believes the Mined Land Reclamation Board is the agency that has the primary authority to implement the narrative standard for ground water at the Summitville Site. MLRB and WQCD established Numeric Criteria Levels for surface and ground water quality at the Summitville Site in SCMCI's operating permit, as well as its 1991 Settlement Agreement between SCMICI and the State of Colorado. These NCLs are not applicable or relevant and appropriate, since they are not legally binding, promulgated regulations. However, these standards have been considered by EPA in establishing its interim action levels for quality because they provide useful information or recommended procedures in addressing the interconnected ground water and surface water at the Site.

This interim ground water standard, since it became effective on August 30, 1994, was not identified as an ARAR in any of the FFSs for the Site. However, since compliance with this ground water ARAR will have little or no impact on the overall scope, performance or cost of the alternatives evaluated, inclusion of this ARAR represents only a minor change to the FFS and Proposed Plan. See "Interim Final Guidance on Preparing Superfund Decision Documents," OSWER Directive 9355.3-02 (June 1989), at p. 5-3.

EPA further expects that once the CWQC completes its use attainability study and classifies Site ground water, the interim narrative ground water standard will be replaced by a "specified area" classification or "site-specific" standard for the Site. This ground water ARAR will be attained by the final remedial action(s) for the Site.

Storm Water Management and Effluent Limitations ARARs

Storm water management is governed by the storm water permitting requirements and the Categorical Standards for Ore Mining and Dressing. Both the storm water permitting program and the categorical standards are as applied pursuant to the Colorado Discharge Permit System. Requirements are collection and treatment of storm waters using the Best Available Technology (BAT) for those storm waters which contact mine waste. In addition, both regulatory programs require implementation of Site-specific Best Practices (BMP). The BMP emphasize storm water diversion and land/soil reclamation to minimize the contact of storm water with mine wastes.

- Copper, Lead, Zinc, Gold, Silver and Molybdenum Ores Subcategory Effluent Limitations, Relevant and Appropriate

The ARAR applies to "process waste waters" only. Process waters are defined in 40 CFR 401.11(q) as:

> "any waters which, during manufacturing or processing, comes into direct contact with or results from the production of any raw material, intermediate product, finished product, by-product, or waste product."

The effluent limitations found in 40 CFR 440.113 would be appropriate relevant to the Water Treatment FTS activities but not applicable because the discharges are not "process waste waters." The IAL established by EPA to meet the surface water quality ARARs are more stringent than these categorical effluent limitations.

- Colorado Discharge Permit System Regulations/Federal Storm Water Permitting Requirements

Colorado's authority to require permits for the discharge of pollutants from any point source into waters of the state are derived from the Federal National Pollutant Discharge Elimination System (NPDES) regulations. (See 40 CFR Part 122.) Colorado's NPDES based program can be found in the Colorado Discharge Permit System Regulations (CDPSR). The WQCC Division Permit issued for the treatment plant at the Site (CDP #CO-0041947), dated November 12, 1991, is the CDPSR document for the Site. Additional permit modification activities are documented in the July 1991 Settlement Agreement and the July 1992 Amendment to the Settlement Agreement.

Storm water is defined in NPDES program as "storm water runoff, surface runoff, snow melt runoff, and surface runoff and drainage". (See 40 CFR 122.26(b)(13).) A permit application is required for active and inactive mining sites where an Owner can be identified and when discharges of storm water runoff from mining operations come into contact with any overburden, raw material, intermediate product, finished product, by product, waste product or areas where tailing have been removed. (See 122.26(b)(14)(iii).) As such, the substantive NPDES Storm Water permit requirements are applicable to discernable surface flows of storm water that contacts waste rock, the crushed ore currently contained in the heap leach pads, wet waste rock (mud), clay ore, or tailings at the Summitville Minesite. Infiltration is not covered by this program. (See 55 FR 47996, left column, center.)

The storm water permit regulations require compliance with Sections 301 and 402 of the Clean Water Act. Sections 301 and 402 require use of BAT to control toxic pollutants, and where necessary, further control to achieve ambient water quality criteria. In addition, the storm water regulations require implementation of stormwater BMP as part of the comprehensive program.

EPA has established effluent limitation guidelines for storm ware discharges from the Ore Mining and Dressing category. These effluent limits require application of BAT to the Ore Mining and Dressing category. In those regulations, EPA has defined "mine" broadly and a in manner which coincides with the definition provided in the Storm Water Permit requirements. (See 40 CFR 440.132(g).) The effluent limitation guidelines for Ore Mining and Dressing also provide an exemption for overflow of excess storm water caused by a greater than a 10 year 24 hour precipitation event when a facility has met certain design and operational prerequisites. This exemption remains in effect as part of the new independent storm ware permitting program. (See 55 FR 48032, right column, bottom.)

Both the effluent limits and the storm water permitting program require application of BAT and, if necessary, additional controls to meet ambient water quality standards. In addition, both programs require implementation of stormwater BMP. The only jurisdictional distinction is that the Ore Mining and Dressing Category effluent limits are not applicable, but instead relevant and appropriate. The recognition by the storm water permit program of the overflow exemption demonstrates the existing equivalence of the programs. Thus, attainment of the Effluent Guidelines and Standards for Ore Mining and Dressing will ensure attainment of the storm water discharge requirements.

Eight outfalls were identified at the Summitville Mine site which meet the point source discharge requirement for storm water permitting. The discharge from each of these outfalls have been attributed to one of three categories of precipitation related discharges defined by the storm water regulations. (See 40 C.F.R. 122.26(b)(13); 55 Federal Register at 48065.)

Pursuant to the NPDES Storm Water Permitting requirements and in response to obligations under the July 1, 1991 Settlement Agreement and Compliance Plan (the Compliance Plan) for Summitville Mine, a two volume Best Management Practices (BMP) plan dated October 31, 1991 was developed. The Compliance Plan required that the BMP provide a reclamation plan and implementation schedule that included existing and planned pollution prevention practices. The BMP also evaluated the need for long term treatment of storm water drainage at the facility.

The BMP was designed to minimize or control contact between precipitation and potential sources of pollutants. The BMP developed at the Summitville Minesite included housekeeping, employee training, inspections, preventive maintenance. In addition, reclamation activities such as grading, stabilization, revegetation, erosion control and sediment control were included as part of the BMP. Each of the measures was designed to protect the existing water quality and quantity during the operation phase and upon closure of the Summitville Mine.

The existing BMP plan which is currently being implemented at the Site and will continue to be implemented regardless of which alternative is selected, attains compliance with the NPDES stormwater and categorical point source standards.

<u>1.5.4.2 Action Specified ARARs</u>

RCRA Subtitle C

40 CFR 261.4(b)(7) specifically excludes "solid waste from the extraction, benefication, and processing of ores and minerals..." from the rules governing management of hazardous waste in Resource Conservation and Recovery Act (RCRA) Subtitle C. Mine wastes present at the Summitville Minesite, including waste rock, the crushed ore currently contained in the heap leach pads, wet waste rock (mud), clay ore, and tailings, were generated as a result of the extraction, processing, or beneficiation of ores and minerals. Accordingly, RCRA Subtitle C not applicable to the remediation of this mine waste.

RCRA Subtitle C may be relevant and appropriate to actions at the Summitville Minesite if the mine waste materials are sufficiently similar to RCRA hazardous waste, particularly if the subject wastes fail the Toxicity Characteristics Leachibility Procedure (TCLP) or exhibit other characteristics of RCRA hazardous wastes (e.g., low pH). (See "Superfund Guide to RCRA Management Requirements for Mineral Processing Wastes, 2nd Edition," OERR Directive 9347.3a-12 (August 1991).)

Further, if the disposal activity involves the use of a waste management unit sufficiently similar to a RCRA regulated unit, and the unit is to receive wastes sufficiently similar to RCRA hazardous wastes, the RCRA Subtitle C requirements pertaining to that type of waste management unit would be relevant and appropriate. (See 55 FR 87630.)

The EPA has stated, when describing its overall liquids management strategy for RCRA Subtitle C land disposal units:

as described in the preamble to the minimum technology regulations (47 FR 32274, July 26, 1982 and 51 FR 10706, March 28, 1986), the Agency's general strategy for such units is to impose design and operation requirements to minimize leachate generation (e.g. caps and prohibition on liquids in landfills) and then m require removal of the leachate before liquids migrate into the environment. (See 52 FR 8712.)

Given the acid and contaminated leachate generating potential of the materials found at the CWP, BMD, SDI and Mine Pits portions of the Site, EPA determined that the wastes are sufficiently similar to hazardous wastes to warrant imposition of selected portions of RCRA Subtitle C requirements. The Subpart L Waste Pile closure requirements, Subpart K Surface Impoundment closure requirements, and Subpart N Landfill closure requirements are therefore relevant and appropriate to the closure of the CWP, BMD, SDI and Mine Pits. Accordingly, following placement of the materials in the Mine Pits, the unit must be closed in a manner that attains the following relevant and appropriate requirements:

- provision of a low maintenance cover that minimizes migration of liquids through the closed unit; promotes effective drainage; minimizes cover erosion; and is capable of accommodating settling and subsidence (see 40 CFR 264.310(a), 264.228(a), 264.258(b)); and

- provision for long term maintenance of the cover, continued operation of the leachate collection system and continued control of runon and runoff (40 CFR 264.310(b), 264.228(b), 264.258(B).)

Colorado Mined Land Reclamation Act

The Colorado Mined Land Reclamation (MLR) regulations at 2 CCR 407-1 require the reclamation of mined areas. The MLR regulations provide specific reclamation criteria which are applicable to the Summitville Minesite. In particular, Rule 3 of the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board is applicable to the remediation being implemented at the CWP. The remedial alternatives must attain the requirements for reclamation measures and the reclamation performance standards found in §§ 3.1.5 (Reclamation Measures - Materials Handling), 3.1.9 (Topsoiling), and 3.1.10 (Revegetation). The general water (§3.1.6), ground water (§3.1.7), wildlife (§3.1.8) and building and structures (§3.1.11) requirements, while also applicable to the CWP interim remedial action, will be met with the attainment of other federal or state ARARs which provide more stringent standards for the same subject matters.

The conditions imposed by the Colorado MLR Permit #M-84-157 for the Summitville Mine stipulated a phased approach to land reclamation which minimizes the total disturbed area at any point in time. When mining activities in each area have been completed and the sections are no longer needed, the permit requires that all land associated with waste dumps, leach heaps, roads, mine pits and plant facilities be reclaimed for forage and timber use. Reclamation activities at the Summitville Minesite will emphasize surface soil stabilization (to include grading, top soil management, and revegetation), preservation of water quantity and quality, and concern for the safety and protection of wildlife.

The reclamation requirements of the MLR are ARARs, not the site specific MLR reclamation plan Regardless, the existing MLR reclamation plan does represent the site specific application of the MLRs, and is, therefore, TBC from an ARAR perspective.

Clean Air Act

Federal and state ARARs were identified for construction and generation of particular matter (PM10) at the Site. An emission permit will be required if temporary construction activities exceed more than two years (See 5 CCR 1001, §3(I)(B)(3)(e).) Control measures to minimize dust and air monitoring will be implemented if necessary during remedial contraction activities. Regulation 1 of the Colorado Air Pollution Control Regulations requires all sources of particulate emissions to utilize technically feasible and economically reasonable control measures. This requirement is applicable to remedial activities that produce fugitive particulate emissions at the Site.

An air pollution permit was applied for at Summitville Minesite for the emission of hydrogen cyanide as a stationary source. The permit included a description of the cyanide heap leach pad process at the Summitville Mine and all associated process chemistry. Permit # 92-RG-653 was given an exempt status in September of 1992. The Summitville Site claimed uncontrolled emissions of less than one ton per year and no emissions of hazardous, odorous or toxic pollutants and was therefore exempt (see 5 CCR Section 3(II)(C)(1)(j).) Thus, this particular requirement is not applicable or relevant and appropriate at the Site.

1.5.4.3 Location Specific ARARs

National Historical Preservation Act

The National Historic Preservation Act (NHPA) requires federal agencies to account for the effects of any federally assisted undertaking on districts, sites, buildings, structures of objects that are included on the National Register of Historic Places. Executive Order 11593 also requires consideration of the cultural environment. Similarly, the Colorado Register of Historic Places establishes requirements for protection of properties of state historical interest. In addition, the Historic and Archeological Data Preservation Act of 1974 establishes procedures to preserve historical and archeological data which might be destroyed through alteration of terrain as a result of federal construction projects.

At the Summitville Minesite, an inventory of historic, cultural and archeological resources will be performed. This inventory will serve to identify cultural and historic resources that must be considered during the development, analysis, selection and implementation of a remedy. In addition, the inventory will identify historic and cultural resources that are candidates for inclusion on either the state or national historic registers.

Endangered Species

The Endangered Species Act requires that federal agencies ensure that federal actions will not jeopardize the continued existence of any threatened or endangered species or impact critical habitat. In response, a Preliminary Natural Resource Survey will be performed to identify natural resources, habitat types, endangered or threatened species, and any potential adverse effects or injury to trust resources.

Protection of Floodplains and Wetlands

Executive Order No. 11988 and Executive Order No. 11990 require federal agencies to evaluate the potential adverse effects of proposed actions on Floodplains and Wetlands, respectively. Floodplains and wetlands potentially subject to adverse impacts from site remedial actions will be inventoried and considered during the analysis, selection, and implementation of the remedy.

Clean Water Act - Dredge and Fill Requirements.

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into navigable waters, including wetlands. The Section 404 requirements are applicable if any remedial action construction will involve dredge and fill activities.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act serves to protect fish and wildlife when federal actions result in the control or structural modification to natural streams or water bodies. Federal agencies must develop measures to prevent, mitigate, or compensate for project related losses of fish and wildlife. Specifically included are projects involving stream relocation and water diversion structures. If applicable, prior to modification of water bodies, the applicable regulations will be followed.

Colorado Wildlife Act

The act establishes the Colorado Wildlife Commission, provides for wildlife management, and prohibits actions detrimental to wildlife. The act is applicable if wildlife observed at the Site would be adversely impacted by the implementation of the remedial action.

Wildlife Commission Regulations

Chapter 10 of the Colorado Wildlife Commission regulations 92 CCR 406-8, Chapter 100 designates and protects certain endangered or threatened species. The regulations are applicable if endangered or threatened species observed at the Site are adversely impacted by the implementation of the remedial action.

Floodplain Management

The Executive Order on Floodplain Management (No. 11988) and 40 CFR §6.302(b) and Appendix A requires federal agencies to evaluate the potential effects of actions they may take in a floodplain and to avoid, to the maximum extent possible, any adverse impacts associated with direct and indirect development in a floodplain. This requirement may be applicable if the remedial activities take place in a floodplain.

Wetlands Protection

Executive Order on Protection of Wetlands (No. 11990) and 40 CFR §6.302(b) and Appendix A require federal agencies to evaluate the potential effects of actions they may take in wetlands, in order to minimize adverse impacts to wetlands. This requirement is applicable if the remedial activities take place in wetlands.

1.6 Summary of Site Risks

The Human Health and Ecological Risk Assessment for the FFS was conducted using relevant EPA guidance including the Risk Assessment Guidance for Superfund (EPA, 1989)and the RCRA Facility Investigation (RFI) Guidance (EPA, 1989). This risk assessment was a screening level risk assessment intended to briefly examine risks associated with the HLP.

1.6.1 Screening Ecological Risk Assessment

A Screening Ecological Risk Assessment for the Summitville Minesite was prepared by EPA in April, 1993. The screening ecological risk assessment reviewed the no action alternative to determine if there is an imminent hazard to the Wightman Fork from the site. Copper, zinc, and cyanide were chosen as the COPC for the assessment.

The assessment modeled, measured, and predicted concentrations and loading of copper in Wightman Fork for three scenarios:

- April 1993 conditions (included treatment of HLP contained water and discharge from the Reynolds Adit);
- Cessation of water treatment activities; and
- Catastrophic release of water contained in the HLP that could result from an event such a failure of Dike 1, the downgradient impoundment feature.

Effects of the contaminants on rainbow trout and brook trout were estimated by correlating acute toxicity levels of the contaminants with measured and predicted concentrations. The degree of metals toxicity for aquatic life as affected by the pH and hardness of water was described. Study results of copper concentrations that are toxic to trout at differing water hardnesses were included in the assessment to illustrate the variation of toxic copper concentrations with water hardness (the sum of calcium and magnesium concentration expressed in terms of equivalent calcium carb

- Continuation of Site water treatment prior to discharge and decrease of loading of metals into the stream to State of Colorado NPDES permit levels;
- Reduction of the flow of contaminated ground water through plugging the adits for long-term metal loading reductions to the Wightman Fork;
- Conducting an ecological survey of Wightman Fork to obtain Site specific information to document actual discharge impacts and document recovery of Wightman Fork after remediation; and
- Completion of a baseline risk assessment because the review of the no action alternative produced an unacceptable risk, defined as exceeding the Low Observed Adverse Effect Level (LOAEL).

The screening ecological risk assessment predicts an imminent hazard to the environment and suggests that all appropriate response actions should be undertaken to prevent the adverse effects from continuing to take place. The remedial actions are intended to stabilize specific portions of the site, prevent further environmental degradation, and achieve significant risk reduction.

1.6.2 Environmental Risk Assessment

<u>1.6.2.1 Aquatic Receptors</u>

In general, the potential risks to aquatic organisms posed by an untreated release from the French Drain are predicted to be immediate and pronounced. Chemicals of potential concern in the French Drain exceed acute and chronic surface water goals by several orders of magnitude. Modeling predicts that concentrations of cyanide discharging from Cropsy Creek remain acutely toxic until the confluence of the Wightman Fork with the Alamosa River. Furthermore, the concentrations of cyanide would remain at levels in excess of the Colorado TVS in the Alamosa River for some distance below Wightman Fork. The TVS are promulgated, risk based standards
developed to protect aquatic life uses.

It is important to note that the Site's impact on pH alone may contribute to toxicity to aquatic organisms, as there is a limited range of pH levels tolerated by aquatic receptors.

Prior to treatment of the Chandler Adit, the Colorado TVs, ARARs Segment 3b of the Alamosa River, were regularly exceeded for copper, zinc, aluminum, iron and manganese. These exceedences are especially problematic as the hardness dependent Colorado TVS may underestimate the potential toxicity of metals in the acid drainage (low pH) environment below the HLP. Normally, toxicity is reduced as hardness is increased. However, an underlying assumption of the criteria is that alkalinity increases as hardness increases. This assumption holds for many natural waters, however, at the Summitville Minesite hardness is relatively high and alkalinity is low. Ranges of data collected by the USGS in 1993 at Station 45.4 from Segment 3b of the Alamosa River are as follows:

Flow Season	Analyte	Maximum	Mean	TVS
May-July	Dissolved Copper	2600.00µg/L	1084.22µg/L	30 µg/L
October-March	Dissolved Copper	780.00µg/L	780.00µg/L	30 µg/L
May-July	Dissolved Zinc	450.00µg/L	301.44µg/L	230µg/L
October-March	Dissolved Zinc	437.00µg/L	437.00µg/L	230µg/L

The Colorado Division of Wildlife, in comments on the proposed ambient water quality standard for the site, found that a self-maintaining population of brook trout was present in the Alamosa river segment that extends from the confluence of the South Fork of the Alamosa to Summitville in 1987 (Colorado Division of Wildlife, 1993.) The population appears to have been eliminated in the intervening years by contamination of the Alamosa River.

1.6.2.2 Terrestrial Wildlife

An untreated release from the French Drain would pose significant risks to bird and mammal populations. Based on the modeled concentrations, risks to terrestrial wildlife from acute and chronic exposures to cyanide would be high along Cropsy Creek and Wightman Fork. The potential for chronic exposure is mitigated by the unsuitable habitats surrounding these sites. The lack of suitable habitats makes regular use of these areas unlikely.

The other chemicals of concern that pose potential acute risks to bird and mammal species in Cropsy Creek include: cadmium, copper, and manganese. Risks from acute exposure in Wightman Fork are substantially lower, although the risks from chronic exposure in those areas with suitable habitat (i.e., natural, undisturbed habitats) may be present.

1.6.3 Human Health Risk Assessment

A baseline human health risk assessment (HHRA) will characterized the risks posed by the COPCs at the Site. The assessment for human exposure to COPCs proceeds with the identification and characterization of likely exposure scenarios, identification and evaluation of exposure pathways, estimation of exposure concentrations, and quantification of chemical intakes.

1.6.3.1 Exposure Scenarios

The potential for exposure is based on the existing Site conditions and potential future Site conditions. Groups assessed for potential exposure pathways include on-site workers, on-site residents, off-site residents, and intruders/trespassers. Presently, access to the Site is being controlled. Current on-site workers, trained under OSHA HAZWOPER, are required to use personal protective equipment (PPE) and are routinely monitored; therefore, they are evaluated under a separate process. Since the Site is a historic mining district, on-site residents are not considered a viable exposed population currently or in the future. Off-site residents and potential off-site recreational receptors will require evaluation during a baseline risk assessment.

1.6.3.2 Exposure Pathways

An exposure pathway describes the route a chemical may take from the source to the exposed individual. A complete pathway consists of four elements: a source and mechanism of chemical release to the environment, an environmental transport medium, a point of potential human contact with contaminated medium, and an exposure route. The transport medium can be air, ground water, soil, surface water, etc. The route can be inhalation ingestion or dermal contact with the medium.

Evaluation of the potential pathways suggests that most exposure pathways at the Site are incomplete. Currently, the only pathway with sufficient data for assessment is surface water. There is insufficient sampling data available to determine whether soil, ground water, and/or air are exposure pathways.

To evaluate current and future risks, EPA is planning to complete a quantitative HHRA in 1995.

1.7 Description of Alternatives

This section describes the alternatives retained for detailed analysis for this interim remedial action. A description of all options considered for operable unit can be found in the Focused Feasibility Study Cropsy Waste Pile, Cleveland Cliffs Tailings Pond, Beaver Mud Dump, and Mine Pits, Summitville Mine Superfund Site, Summitville, Colorado. The Cleveland Cliffs Tailings Pond is now being referred to as the SDI. The alternatives were developed based on Site conditions prior to the initiation of response actions by EPA at the CWP, BMD, SDI and Mine Pits. Site conditions in 1993 warranted that a non-time critical removal action be implemented to begin to address environmental hazards at the CWP, BMD, SDI and Mine Pits. Currently, Site conditions dictate a transition from emergency response action to remedial action The purpose of this IROD is to provide the documentation required to complete the response actions at the CWP, BMD, SDI and Mine Pits using CERCLA Remedial Authorities.

The Remedial Action alternatives were developed to eliminate or reduce the AMD generated from the CWP, BMD, SDI and the Mine Pits. The following five alternatives were retained for detailed analysis:

Alternative #1 No Action;

Alternative #2 Water Treatment;

Alternative #3 Removal to the Mine Pits;

Alternative #4 Cropsy Valley Adit Drain; and

Alternative #5 Cropsy Channel Drainage.

1.7.1 Alternative #1 No Action

Inclusion of a no action alternative is consistent with the NCP and is required under CERCLA and SARA. The purpose of the no action alternative is to provide a baseline against which other alternatives can be compared. The no action alternative is the cessation of current water treatment activity and sediment control on the Site. Existing treatment infrastructure would be mothballed (mothballing is done to ensure reactivation without excessive expense for replacement of equipment damaged by severe weather or other consequences of inactivity). Ditches and ponds used to control surface runoff and sediment would not be maintained. Access to the Site would not be restricted. Monitoring to record and evaluate contaminant transport effects on human health and the environment would continue.

1.7.2. Alternative Water Treatment

Alternative #2 will prevent AMD from migrating from the CWP, BMD, SDI and Mine Pits to the Alamosa River system by capturing AMD generated from these areas and treating the water using the existing water treatment facilities. Other water treatment systems were considered. However, it was determined that the water treatment capacity in the existing facilities was sufficient. The existing facilities are capable of meeting discharge stands and are the most cost effective for this interim action. It is anticipated that the existing treatment plants will require replacement within a ten-year timeframe. Therefore, treatment costs have been estimated for the ten-year period. Modifications, improvements and replacement of the existing facilities will be evaluated during the sitewide feasibility study.

Part of the water treatment alternative is already in place. Water is being pumped from wells at the foot of the CWP and treated at the CWTP. Additionally, French Drain water (CWP underflow) is being pumped into the HLP. Currently, AMD generated from the BMD and SDI is released to the Wightman Fork without treatment. To treat these flows, a trench would be installed at the base of the BMD to collect AMD. Water collected in this trench and the SDI would be pumped to the existing water treatment facilities. The water would be treated at the water treatment facilities to meet discharge standards prior to release to the Wightman Fork. It is estimated that an average of 161.4 million gallons per year (MGY) of water would require treatment.

1.7.3 Alternative #3 Removal to Mine Pits

The intention of this alternative is to eliminate or reduce the generation of AMD by isolating the waste from water and/or oxygen. The naturally occurring surface water seeps that were covered during the construction of the CWP and the BMD would be uncovered. It is anticipated that the water quality from these uncovered seeps and springs would be of sufficient quality that treatment would not be required. Thus, this water would be directed to Cropsy Creek or the Wightman Fork without treatment. Also, acid generating waste and sediments would also be removed from the SDI. Wastes would be placed in the Mine Pits such that precipitation would drain away rather than collecting in the Mine Pits. Thus, reducing the hydraulic loading to the underground workings.

The CWP would be excavated to an elevation of 11,620 feet with loaders and trucks, transported to the Mine Pits, and used to fill the Mine Pits. Based on historical data and aerial photograph, this excavations should expose the majority of seeps covered by the CWP. If the excavation fails to uncover any significant seeps and springs, additional CWP material will be excavated by a series of cuts. The depth of each cut will be 10 ft. in thickness to conserve both capital and manpower expenditures. The flow from seeps and springs that are exposed and surface water runoff will be diverted into Cropsy Creek. After excavation is completed, the area would be vegetated.

The acid generating wastes materials found in the BMD and SDI will be excavated or dredged and placed in to the Mine Pits. The flow from the seeps and springs that are uncovered from this excavation will be diverted to the Wightman Fork. Once all of the waste material had been removed the area would be vegetated. The SDI would be converted to a storm water management pond.

The provision for the short term treatment of water expressed from the uncovered springs and seeps is included. Due to mining wastes placed over the springs and seeps, ground water located under the waste piles may have become contaminated. Water treatment would be necessary prior to release the water from the springs and seeps until the contamination has been flushed from the ground. It is anticipated the water quality in the uncovered springs and seeps will rapidly return to premining conditions.

Prior to placement of mining waste into the Mine Pits, a clay liner will be placed in the bottom of the Mine Pits to a finished thickness of three feet. The clay liner will extend up the pit walls 60 feet in the South Pit and 40 feet in the North Pit. A five foot layer of lime kiln dust will be placed on top of the clay liner in the bottom of the Mine Pits. The lime kiln dust is being placed in the Mine Pits to neutralize any AMD generated prior to completing construction. The final surface contour in the Pits would be self draining and capped to reduce the volume of water percolating through the waste material placed in the Pit.

The estimated quantity of mining waste to be moved to the mine pits is 4.5 million cubic yards. An estimated volume of 160 million gallons per year of AMD would not be generated if this alternative is implemented.

1.7.4 Alternative #4 Cropsy Valley Adit

The intention of Alternative #4 is to eliminate or reduce the generation of AMD by dewatering the CWP with a drainage adit and isolation of the waste currently located in the BMD, SDI from water and/or oxygen. To dewater the CWP, a drainage adit would be located and driven into the bedrock below the HLP and CWP. The adit would extend approximately 1 mile in length under both piles at an inclined grade of 8% or greater from the portal entrance. Side cuts and drain holes will be placed based on coring ahead of and to the side of the main tunnel to maximize drainage of the Cropsay Valley. Water entering the adit from different zones would be segregated. It is anticipated that some flows would require treatment prior to discharge to the Wightman Fork.

The acid generating wastes found in the BMD and SDI will be excavated or dredged and placed in to the Mine Pits. The flow from the seeps and springs that are uncovered from this excavation will be diverted to the Wightman Fork. Once all of the waste material had been removed, the area would be vegetated and the SDI would be converted to a storm water management pond. The provision for the short term treatment of uncovered springs and seeps is included. Due to mining wastes placed over the springs and seeps, ground water located under the waste piles may have become contaminated. Water treatment of these springs and seeps would be concluded one of the contamination has been flushed from the ground. It is anticipated the water quality in the uncovered springs and seeps will rapidly return to premining conditions.

Prior to placement of mining was into the Mine Pits, a clay liner will be placed in the bottom of the Mine Pits to a finished thickness of three feet. The clay liner will extend up the pit walls 60 feet in the South Pit and 40 feet in the North Pit. A five foot layer of lime kiln dust will be placed on top of the clay liner in the bottom of the Mine Pits. The lime kiln dust is being placed in the mine pits to neutralize any AMD generated prior to completing construction. The final surface contour in the Pits would be self draining and capped to reduce the volume of water percolating through the waste material placed in the Pit.

The estimated quantity of mining waste to be moved to the mine pits is 2.5 million cubic yards. An estimated volume of 160 million gallons of year of AMD would not be generated if this alternative is implemented. However, additional AMD may be released from adit.

1.7.5. Alternative #5 Cropsy Channel Drainage

The intention of Alternative #5 is to eliminate or reduce the generation of AMD by dewatering the CWP with drainage channel in the Cropsy Valley and isolation of the waste currently located in the BMD and SDI from water and/or oxygen. The drainage channel in the Cropsy Valley would consists of re-channeling approximately 4,500 linear feet of Cropsy Creek starting at the existing Cropsy Creek Diversion. The channel will traverse a path through Dikes 2 and 3; through the northwestern portion of the HLP, including Dike 1; and continue on to the French Drain Sump. The drainage channel is intended to provide a pathway for the water to be released from the CWP.

The entire channel would be excavated into bedrock to a minimum depth of 5 feet to minimize erosion. The channel would intercept flow from the french drain beneath the CWP. The channel would be constructed to expose different qualities of waters. Uncontaminated drainage could be released directly to Cropsy Creek; contaminated drainage would be diverted into the French Drain Sump for subsequent treatment before release into Cropsy Creek.

The channel would be routed so that approximately 3,200 linear feet would be constructed in andesite bedrock and 1,300 linear feet in quartz-latite bedrock. The portion of the channel located in quartz-latite bedrock would be lined with concrete, gunmite or grouted riprap, and bermed/ditched on both sides to prevent contact with acid-forming quartz-latite resulting in contaminating the streamflow. Acidic waters collected in the underdrain and surface ditches would be diverted for subsequent treatment. A 10 foot wide road would be constructed on one side of the channel to provide work stations and maintenance access.

The acid generating wastes found in the BMD and SDI will be excavated or dredged and placed in to the Mine Pits. The flow from the seeps and springs that are uncovered from this excavation will be diverted to the Wightman Fork. Once all of the waste material had been removed, the area would be vegetated and the SDI would be converted to a storm water management pond. The provision for the short term treatment of uncovered springs and seeps is included. Due to mining wastes placed over the springs and seeps, ground water located under the waste piles may have become contaminated. Water treatment of these springs and seeps would be concluded one of the contamination has been flushed from the ground. It is anticipated the water quality in the uncovered springs and seeps will rapidly return to premining conditions.

Prior to placement of mining waste into the Mine Pits, a clay liner will be placed in the bottom of the Mine Pits to a finished thickness of three feet. The clay liner will extend up the pit walls 60 feet in the South Pit and 40 feet in the North Pit. A five foot layer of lime kiln dust will be placed on top of the clay liner in the bottom of the Mine Pits. The lime kiln dust is being placed in the mine pits to neutralize any AMD generated prior to completing construction. The final surface contour in the Pits would be self draining and capped to reduce the volume of water percolating through the waste material placed in the Pit.

This alternative would result in the excavation of approximately 1 million cubic yards of the CWP, 1.2 million cubic yards of the HLP, 1.5 million cubic yards of the BMD/SDI, 4,000 cubic yards of quartz-latite bedrock, and 8,000 cubic yards of andesite bedrock. The excavated materials would be used to either recontour both the HLP and CWP or placed in the mine pits.

1.8 Comparative Analysis of Alternatives

Provisions of the NCP require that a limited number of alternatives that represent viable alternatives be evaluated against nine criteria in 40 CFR 300.430(e) (9). The alternatives are evaluated against each of these criteria and then against each other to determine the preferred alternative. Table 9 presents a summary of this analysis. The alternatives were evaluated based on Site conditions prior to the initiation of any response actions by EPA at the CWP, BMD, SDI and Mine Pits. However, Site conditions in 1993 warranted that a non-time critical removal action be implemented to begin to address environmental hazards at the CWP, BMD, SDI and Mine Pits. Currently, Site conditions dictate a transition from emergency response actions to remedial action. The purpose of this IROD is to provide the documentation required to complete the response actions at the CWP, BMD, SDI and Mine Pits using CERCLA Remedial Authorities.

1.8.1 Criteria 1: Overall Protection of Human Health and the Environment

The overall protection of human health and the environment criteria addresses whether or not the interim remedial action provides adequate protection and describes how risks posed through exposure pathways are eliminated, reduced, or controlled.

Alternative # 1, the no action alternative, does not alleviate the threat to human health and the environment. Toxic AMD would continue to be generated from the CWP, BMD, SDI and the Mine Pits and released to the Alamosa River System under Alternative #1.

Alternative #2, 3, 4 and 5 are protective of human health and the environment. Under Alterative #2, the toxicity of the AMD generated from the CWP, BMD, SDI and the Mine Pits is removed by collecting the AMD and treating the water prior to release to the Alamosa River System. Alternatives #3 prevents the generation of AMD by isolation of the waste from water and/or oxygen. Alternative #4 is intended to prevent the generation of AMD by dewatering the CWP by placement of a drainage adit in the Cropsy Valley and isolation of the waste currently located in the BMD and SDI from water and/or oxygen. Alternative #5 is intended to eliminate or reduce the generation of AMD by dewatering the CWP by installing a drainage channel in the CWP and isolation of the waste currently located in the BMD and SDI from water and/or oxygen.

1.8.2 Criteria Compliance with ARARs

Alternative #1, no action does not attain the chemical specific ambient water quality ARAR identified for Segment 3b of the Alamosa River. Alone, Alternatives 2, 3, 4, or 5 will not attain the chemical specific ambient water quality ARAK identified for Segment 3b of the Alamosa River. In conjunction with the other interim remedial actions, EPA has determined that Alternatives 2, 3, 4, and 5 will attain the surface water quality ARARs at the point of compliance.

Alternative 1 and Alternative 2 fail to implement acceptable BMP for surface water control. Alternatives 3, 4 and 5 eliminate contact of storm water with mine waste materials following closure.

Alternatives 3, 4 and 5 involve the placement of wastes in the Mine Pit. These alternatives will attain the RCRA Subtide C Closure requirements.

Alternatives 3, 4, and 5 involve reclamation activities. These alternative will attain the MLRB requirements.

Alternatives 3, 4, 5 involve potential for significant fugitive particulate emissions during implementation. The ARAR will be attained.

After an investigation is completed, Alternatives 2, 3, 4 and 5 will attain all location-specific ARARs.

1.8.3 Criteria 3: Long-term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of a remedy to provide reliable protection of human health and the environment over time.

All of the alternatives, except for alternative #1, will provide long term effectiveness and permanence. The long-term effectiveness of Alternatives #2, 4 and 5 was found to be moderate since both of these alternatives are dependent on long-term operations and maintenance. If required operations or maintenance is ceased, the effectiveness and permanence of these alternatives would be jeopardized.

Alternative #3 was found have the highest overall long-term effectiveness. With Alternative #3, the majority of the seeps and springs covered by the CWP and BMD will be exposed. Thus, water expressed from these seeps and springs will no longer come in contact with mining waste that has the potential to produce AMD. In addition, acid generating wastes in the SDI will also be removed. In Alternative #3, the mining wastes would be placed in the Mine Pits such that long-term permanence is achieved.

1.8.4 Criteria 4: Reduction of Toxicity, Mobility, and Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the preference for a remedy that reduces health hazards, the movement of contaminants, or the quantity of contaminants at the Site. None of the alternatives reduce the toxicity, mobility or volume of the sources of contamination through treatment. However, the potential of generating AMD will be diminished by placing the material into the Pit.

1.8.5 Criteria 5: Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to complete the remedy and any adverse effects to human health and the environment that may be caused during the construction and implementation of the remedy.

Alternatives #2, 3, 4, and 5 utilize water treatment and other engineering controls to reduce releases from the Site to achieve short-term effectiveness. The no action alterative is not effective in the short-term. Under the no action alternative, it is anticipated that the contaminant loading to the environment would increase immediately.

1.8.6 Criteria 6: Implementability

Implementability refers to the technical and administrative ease or difficulty of initiating and performing a remedy. This includes the availability of materials and services to carry out a remedy. It also includes coordination of Federal, State, and Local government efforts to clean up the Site.

Alternative #1, the no action alternative was determined to be easily implemented. All that is required from this alternative is to moth ball the currently operating water treatment facilities. Alternative #3 was also determined to be easily implemented. Standard construction practices are utilized in this alternative.

Alternative #2, 4, and 5 were found to have a moderate degree of implementability. The operation of water treatment facilities in the freezing winter conditions makes Alternative #2 difficult to implement. For Alternative #4, the methodology of effectively diverting and disposing of the waters within the adit is untried and unproven. Therefore, the ease of implementing this alternative and the availability of material and qualified, experienced personnel is suspect. In Alternative #5, the installation of the lining required to control seepage from the bedrock into the channel could be difficult to achieve. Also, it is uncertain if the french drain under the CWP could be successfully intercepted.

1.8.7 Criteria 7: Cost

Cost evaluates the estimated capital plus the treatment and assessment (T+A) costs of each alternative in comparison to other equally protective alternatives. The costs for each alternative are summarized on Table 9 and are presented in detail in the FFS.

Alternative #3 has the lowest present worth costs with the exception of the No Action alternative. Alternative #5 has the next lowest present worth costs. Alternative #2 has the highest present worth costs.

1.8.8 Criteria 8: State Acceptance

The State of Colorado has worked in partnership with the EPA throughout the development of this IROD and concurs with the selected remedy.

1.8.9 Criteria 9: Community Acceptance

The Proposed Platt was issued to the public in August, 1994. Two public meetings were held in Alamosa, Colorado to present the Proposed Plan and to take public comment. The community response to the alternatives is presented in the Responsiveness Summary for CWP, BMD, SDI, and Mine Pits, which addresses comments received during the public comment period.

1.9 The Selected Alternative

Based on the comparative analysis of the nine criteria, Alternative//3, removal to the Mine Pits is the selected remedy for the CWP, SDI, BMD, and Mine Pits interim remedial action.

The major components of the selected interim alternative include:

Excavation of the CWP to an elevation of 11,620 feet.

Excavation of the BMD and SDI.

Line the bottom of the Mine Pits with a layer of pH neutralizing material.

Placement and capping of excavated material in the Mine Pits.

1.10 Statutory Determinations

The selected remedy meets the statutory requirements of Section 121 of CERCLA as mended by SARA. These statutory requirements include protection of human health and the environment, compliance with ARARs, cost effectiveness, utilization of permanent solutions and alternative treatment technologies to the maximum extent practicable, and preference for treatment as a principal element. The manner in which these requirements are met utilizing the selected remedy is presented in the following discussion.

1.10.1 Protection of Human Health and the Environment

The selected remedy provides interim protection to human health and the environment by removal of wastes from the CWP, BMD and SDI and placement in the Mine Pits. The waste will be capped to reduce the volume of water percolating through the waste material placed in the Pit. The remedy will reduce the volume of AMD originating from the Site which is severely impacting Wightman Fork and the Alamosa River.

1.10.2 Compliance With Applicable or Relevant and Appropriate Requirements

Under Section 121 (d)(1) of CERCLA, remedial actions must attain standards, requirements, limitations, or criteria that are applicable or "relevant and appropriate" under the circumstances of the release at the Site. The selected remedy meets all applicable or relevant and appropriate requirements of State and Federal Laws or waives these requirements in accordance with Section 300.430 (f)(i)(ii)(c)(1). The interim remedy rapidly reduces risk and will not exacerbate Site problems or interfere with the final remedy.

Specifically, this remedy will not attain the surface water quality Applicable or Relevant and Appropriate Requirements (ARARs) for metals in the Alamosa River at this time. However, this action will comply with surface water ARARs when implemented in concert with the other interim remedial actions proposed for the Site.

1.10.3 Cost Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, the net present worth value being $40,837,975. Removal and capping is a proven technology in the protection of human health and the environment.

1.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable (MEP)

It has been determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner to address the control of AMD at the Summitville Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, it was determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness, reduction in mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance.

The selected remedy reduces the principal threats posed by the possibility of AMID entering the surface water system by permanently reducing the generation of AMD from the CWP, BMD, SDI and the Mine Pits. Water quality drainage from the Site is expected to improve as interim remedial action is completed. This improvement, along with other actions being considered for the Site, will result in decreased pollutant content in water feeding the Alamosa River and Terrace Reservoir.

2.0 RESPONSIVENESS SUMMARY FOR THE CROPSY WASTE PILE, BEAVER MUD DUMP, SUMMITVILLE DAM IMPOUNDMENT, AND MINE PITS.

This Responsiveness Summary was developed in accordance with the EPA guidance document, "Community Relations in Superfund: A Handbook" (EPA/540/R-92/009).

2.1 Responsiveness Summary Overview

Prior to the public comment period, the EPA and the Colorado Department of Public Health and Environment (CDPHE) selected a preferred alternative for the CWP, BMD, SDI, and Mine Pits remediation at the Summitville Mine Superfund Site (Site) based on information provided in the CWPFFS. The preferred alternative specified in the IROD addressed the reduction of acid generation caused by infiltration of surface waters into the sulfide mineral zones (including rock-filled areas) on the Summitville Mine Superfund Site through containment practices. The interim remedy addresses the principal threat posed by surface waters infiltrating areas that were not addressed in other operable units, but were previously disturbed by mining and/or mining related activities. The interim action is consistent with any future actions to complete the remediation of the entire Site, and is a logical step in the remediation process.

The major components of the preferred alternative include:

- Excavation of the CWP to an elevation of 11,620 feet.
- Excavation of the BMD and SDI.
- Line the bottom of the Mine Pits with a layer of pH neutralizing material.
- Placement and capping of excavated material in the Mine Pits.

Implementing this interim action will achieve protection of human health and the environment

The comments received during the extended public comment period suggest that the San Luis Valley residents, the TAG Members, the Colorado Mining Association, and other Colorado residents are concerned about several issues regarding CWP, BMD, SDI, and Mine Pit areas of the Site.

The EPA held a public comment period from August 23, 1994 to October 23, 1994 for interested parties to comment on the CWP, BMD, SDI, and Mine Pits FFS for the Summitville Minesite and the Proposed Plan for the Summitville Mine.

EPA held public meetings on September 8 and October 12, 1994 in Alamosa, Colorado to present the results of the FFS and the preferred alternative as presented in the document. All comments received by the EPA prior to the end of the public comment period, including those expressed verbally at the public meetings are summarized in this Responsiveness Summary.

2.2 Response to CWP, BMD, SDI, and Mine Pits Specific Comments

2.2.1 Summary and Response to Local Community Concerns

<u>2.2.1.1 Ground Water</u>

Comment 1:
Will you be conducting additional studies to gain a better working knowledge of the site's hydrogeology?

Response:
Yes, EPA will begin conducting additional hydrogeological studies in 1995.

Comment 2:
Will contamination of regional ground water be exacerbated after moving waste materials to the Mine Pits?

Response:
The placement of waste materials in the Mine Pits is designed to reduce the generation of AMD by encapsulating over two million cubic yards of potentially acid generating rock. This reduces the impacts on regional ground water. Removal to the Mine Pits with pH amendments will directly address the sources of contamination and will reduce the toxicity, mobility, or volume of contaminated water at the Site by 80%.

2.2.1.2 CERCLA Process

Comments 3:
No cost/benefit evaluation of those alternative was performed, which is typically included in a feasibility study.

Response:
EPA is required to base decisions for Remedial Actions on nine evaluation criteria of which cost is one of the criteria. A range of costs (i.e. low, medium, and high) was discussed for each alternative.

Comment 4:
The removal of the CWP does not constitute an immediate threat to human health and the environment and does not constitute an emergency situation that compels immediate action.

Response:
EPA had determined that an immediate threat to human health and the environment existed, and conditions at the site justified the implementation of a non-time critical removal action for removal of the CWP. This determination is documented in the EPA Action Memorandum dated December 18, 1992 (Ref: 8HWM-ER, Site ID#: Y3) which states, "Conditions existing at the Summitville Mine present an immediate and substantial threat to human health and the environment and meet the criteria for initiating a Classic Emergency Removal Action (Removal Action) under 40 CFR 300.415 of the National Contingency Plan (NCP)".

2.2.1.3 Storm Water

Comments 5:
Need Summitville Dam Impoundment area incorporated into Site storm water management and other surface water plans.

Response:
EPA agrees. SDI area will be incorporated in the storm water management plan.

2.2.1.4 Preferred Alternative

Comment 6:
Does the $40.8 million price tag for the preferred alternative include monitoring costs?

Response:
Yes.

Comment 7:
Has waste isolation been tried and been found to be successful at other sites similar to Summitville?

Response:
Yes. Almost every mine reclamation project hat included in its plans the isolation of waste materials. For example, New Jersey Zinc Company is consolidating mining wastes in a repository at the Eagle Mine in Colorado.

Comment 8:
If no immediate reduction of contaminated water flows was expected, what was the rationale for the action taken in 1993 and 1994 regarding removal of the CWP.

Response:
EPA acknowledges that an immediate reduction in contaminated water flows may not occur due to AMD that already may have flowed into soils and ground water below the waste piles. EPA anticipates that once the waste rock has been removed and contaminated water has been flushed out, the water quality in the exposed springs and seeps located under the existing CWP will return to pre-SCMCI conditions.

2.2.1.5 Summitville Dam Impoundment/Beaver Mud Dump

Comment 9:
The hydrogeologic setting of the SDI/BMD is significantly different than that of the CWP. No assessment was performed by EPA to evaluate the amount and mechanism by which the SDI/BMI) contribute AMD to Wightman Fork.

Response:
The hydrogeologic setting of the SDI/BMD is similar to that of the CWP. In both areas, springs and seeps located under the waste pile are responsible for the providing water necessary for the generation of AMD.

Section 2.1.2 of the FFS references the hydrogeologic assessments performed for the SDI/BMD. In this section, it is estimated that 36.3 million gallons per year of AMD are generated from the SDI/BMD. This water is presently not treated and discharging into the Wightman Fork.

Comment 10:
Does the chemical nature from the SDI/BMD warrant taking a response action?

Response:
The SDI is a historic sulfide rich tailings pond located within the former Wightman Fork drainage bed. The Wightman Fork was routed around the SDI. While the pond only contains about 133,000 cubic yards of material, it is thought to be hydraulically connected to the Wightman Fork and, therefore, providing AMD directly into the creek (Ecology & Environment, Inc. 7/93).

2.2.1.6 Cropsy Waste Pile

Comment 11:
Another alternative that would effectively eliminate water buildup behind the dikes is the redesign and construction of the CWP containment berm and French Drain System to intersect the existing Heap Leach French Drain System. This alternative was not considered.

Response:
EPA considered this option. However it was defined not to be feasible because it would destroy the dike liner under the Heap Leach Pad.

2.2.1.7 Mine Pits

Comments 12:
What, if any, and how much material such as clay was placed on the bottom on the mine pits before wastes were disposed in them? If there's a clay layer, is this the same on-site clay that was identified as being an acid-producing material? Will there be some kind of material (for example concrete) used to line the walls of the mine pits so that water cannot seep into the wastes?

Response:
During Phase I of the Cropsy Waste Pile Removal Action, a clay liner was placed to a compacted three foot thickness on the floor and wall of the North and South Pits. Clay used for this phase was capping material from the CWP. No testing for acid generating contaminants was conducted since the primary purpose of the clay barrier was to prevent upward migration of acidic solutions into the mine pits. In addition, the clay was to be overlaid with lime kiln dust (LKD).

Comment 13:
Was the mine pit lined with a lime material to buffer acid production? If so, how much? How long will this material's buffering capacity last?

Response:
To add buffering capacity and to offset any negative water quality impacts during construction activities, LKD was transported to the site and placed in the Mine Pit during Phase I of the Cropsy Waste Pile Removal Action. The LKD was placed in a continuous 5-foot layer over the compacted clay liner in the lowest levels of the Mine Pits. Approximately 1,800 tons of LKD was placed in the Mine Pits. The material's buffering capacity is intended to last through the completion of construction activities at the Mine Pits.

Lime kiln dust, comprised largely of calcium oxide, behaves as a base (i.e. would tend to raise the pH of a given solution when introduced). Therefore, an acidic solution, when contacting the LKD layer will be neutralized.

Comment 14:
Relocation of CWP to the Mine Pits is implementable and would be as effective as the design and/or construction of the liner and placement requirements. Currently only compaction on the southern side of the Mine Pits is used and it is unclear how effective this compaction will be.

Response:
Cropsy waste material was spread in horizontal lift thicknesses of 24 inches and 12-feet wide along the perimeter of all of slopes of the Mine Pits and compacted with a tamping roller. This compacted zone was designed to significantly reduce, or prevent, long-term infiltration of ground water from the perimeter of the Mine Pits into the potentially acid producing waste materials. The majority of the CWP was placed in the South Pit in a single 40-foot lift over the compacted clay liner and LKD.

Comment 15:
Design parameters for the cap on the Mine Pits are not discussed.

Response:
The design for the cap has not been completed. EPA will make the design available to the public for review and comment after it is 90% complete.

Comment 17:
Design parameters for the cap on the Mine Pits are not discussed.

Response:
The design for the cap has not been completed. EPA will make the design available to the public for review and comment when the 90% design document is developed.

Comment 18:
Clay liners from on-site materials have AMD potential. How is this potential minimized, eliminated or controlled?

Response:
Clay liners installed to date have been in the mine pits and were used for preventing upward migration of acidic solutions from the old underground mine workings. The clay for these liners was taken from the CWP and have lower acid generating capability than the Clay Ore Stockpile material.

Comment 19:
Caps contribute to poorer water quality since they rechannel contaminated water into other drainage channels that weren't serviced by water treatment facilities.

Response:
Caps are designed to prevent surface water runoff from coming in contact with wastes that are acid generating. Thus, surface water runoff from caps should be of sufficient water quality so that treatment is not required prior to discharge from the Site.

2.2.1.8 Comparative Analysis

Comment 19:
Why were natural wetlands, such as the iron bogs located at the Site, not identified as an alternative for the CWP, BMD, and SDI?

Response:
Engineered wetlands and/or bogs are TBC as a final reclamation goal. Locations being considered include the SDI/BMD sites. Research work is presently underway on the application of wetlands to the Summitville Site.

Comment 21:
Why was capping the CWP in place not considered as an alternative in the FFS?

Response:
The CWP was capped by SCMCI. The cap was effective in reducing the volume of precipitation percolating through the waste. However, springs and seeps located under the CWP provided a significant source of water for AMD generation. Thus, capping of the CWP in place was found to be not feasible.

Comment 22:
Why was submergence of the SDI/BMD not considered as an alternative in the FFS?

Response:
Historically, containment and control structures have been constructed for the SDI/BMD. These measures have been ineffective in controlling AMD from this material. The EPA believes this is due to its placement within the Wightman Fork drainage and is being located adjacent to the creek.

Comment 23:
The basis for the cost developed for each alternative was not provided.

Response:
Appendix E of the FFS provides details on how the costs were developed.

2.2.2 Comprehensive Response to Specific Legal and Technical Questions

This section summarizes and responds to the specific legal and technical concerns raised during the public comment period.

2.2.2.1 Ground Water

Comment 24:
How could water backing up behind the Reynolds Adit impact the integrity of the bottom of the mine pits where the highly reactive wastes will be disposed? How will you know if water has risen to that level?

Response:
There are many alternatives for controlling the water backing up behind the Reynolds Adit. Additional Ground water studies will provide the data needed to determine the best approach for controlling ground water. Monitoring wells placed in the mine pits will be able to determine if the water has risen into the waste.

Comments 25:
This FFS does not include a description of the promised state-of-the-art ground water flow model that was supposedly developed to make these necessary evaluations. The model, as well as information on model assumptions, model hydrogeologic boundary conditions, model parameters, and model calibration, should be included in the FFS. The results of such modeling evaluations may significantly alter the conclusions of the FFS with regard to replugging the Chandler Adit and placement of the CWP and SDI/BMD in the Mine Pits. As an example, if the water table rises in the Mine Pits, they could be a new source of AMD. Such simulations would have provided insight into the water table levels which could affect conclusions regarding the effectiveness of the selected alternative.

Response:
When considering the back-filled mine pits as a future possible source of AMD, the confinement and placement of the fill material must be evaluated as well as the material itself. The CWP is made up of three distinct types of material: the mine waste material layer of compacted clay subsoil material which functioned as a cap, and a layer of topsoil about 10 inches thick covering the pile entirely.

Topsoil material, about 72,000 cubic yards, was salvaged from the surface of the CWP and relocated. The clay cap material was stripped and placed in the bottom of the pits and finished to a three foot thickness. This clay liner was placed continuously over the floors of the pits and 40 to 60 feet up the pit walls. About 76,000 yards of clay were employed in this manner covering 10.4 acres of pit area. To add buffering capacity and offset negative water quality impacts, a five foot thickness of LKD was placed over the clay.

After the mine pits are back-filled to a final elevation of about 11,765 feet, they will be capped with natural materials, an enhanced materials cap, or with a geosynthetic membrane. The resulting structure will mount to an encapsulation of the acid generating material. Capping is a "containment technology" leaving the contaminant in place and controlling migration.

At Summitville, the cap is intended to reduce the mount of water percolating down to the waste material in the pit. Water that percolates through may become acidic but would be neutralized upon contact with the LKD.

Comment 26:
The FFS does not provide an adequate description of the ground water flow conditions at the Site. A discussion of the prevailing ground water flow systems should be provided, including the ground water flow direction, permeabilities, and storage coefficients. Also, there is no discussion provided on the regional and local hydrogeologic boundary conditions at the Site. It is unclear where the recharge and discharge (seep) areas occur, and the hydrogeologic effect of the underground workings and their significance as a hydrogeologic boundary condition are unknown. The text does not discuss how plugging of the Reynolds Adit will affect the ground water table conditions at the site. If these conditions are unknown, at least a qualitative description is necessary.

Response:
Ground water at the Site is present in a series of intermittent, shallow, perched aquifers, and numerous springs and seeps exist. Depth to water is variable with the exception that, in the vicinity of the old mine workings, water depth can attain 300 feet.

Plugging of the Reynolds Adit will reduce the metal loading to Wightman Fork and is expected to cause resaturation of the South Mountain slope. It is estimated that resaturation will take about seven years and that ground water, flowing northeast toward Wightman Fork, will take about 20 years to reach Wightman Fork, 2.2.2.2 CERCLA Process

Comment 27:
The remedy for the CWP, BMD/CC, and Mine Pits was selected and implemented prior to development of the FFS and without providing a meaningful opportunity for the public to comment.

Response:
See Comment 1 in Section 2.3 Summary and Response to General Comments.

2.2.2.3 Remedial Investigation

Comment 28:
Need Remedial Investigation site characterization plan.

Response: A sitewide remedial investigation and Feasability Study will be completed in 1995/1996.

2.2.2.4 Summitville Dam Impoundment/Beaver Mud Dump

Comment 29:
The administrative record for this portion of the Site does not presently support EPA's determination that the SDI area requires remediation.

Response:
As previously stated, it is believed that the SDI is hydraulically connected to Wightman Fork and, Therefore, is a direct outlet for untreated AMD. It is also estimated that SDI/BMD contribute 17,000 pounds of copper per year to Wightman Fork.

2.2.2.5 Cropsy Waste Pile

Comment 30:
The FFS states that removal of the CW to the Mine Pits will reduce and/or eliminate the build up of ground water above the HLP Dikes 2 and 3 at the toe of the existing CWP, thereby reducing the probability of AMD forming upgradient of the HLP and thus reducing the possibility of the crushed ore becoming acid forming upon completion of the HLP detoxification. However, it is unlikely to be effective if considerable springs are left below the planned levels of the Phase H CW removal The planned excavation may not uncover all the seeps.

Response:
EPA based its excavation limits on historic areal photography and the historical descriptions of the valley prior to placement of mining wastes in the Cropsy Valley. Based on this data, a significant contribution of the seepage from CWP will be eliminated EPA will evaluate if further excavation is required after completion of the Phase II Removal Action.

2.2.2.6 Mine Pits

Comment 31:
Effectively, a landfill is being created in the Mine Pits. Are State permitting requirements for mine wastes used in the design? Are State permitting requirement for water treatment sludges implemented in the design? Will post-closure monitoring requirements from the State be met?

Response:
The EPA is not required to obtain permits for the implementation of response actions at Superfund Sites. However, EPA must meet the substantive requirements of permits for all actions taken. The State of Colorado has reviewed and concurred on the design for the placement of the mine waste and water treatment plant sludges into the Mine Pits. The scope of post-closure monitoring is being developed as part of the sitewide ground water monitoring program.

Comment 32:
An explanation of how the design prevents future production of AMD from seeping through the adit workings is necessary in evaluating this alternative. The engineering guidelines that are being used to place the materials in the pits, and how implementation of these guidelines prevent future generation of AMD are not explained or described.

Response:
The design prevents the production of AMD by reducing the volume of water and oxygen that comes into contact with the waste. By consolidating the waste in the Mine Pits, the water from precipitation and seeps under the CWP and BMD will no longer contact acid generating materials. Also, the cap on the Mine Pits will be designed so that the majority of the precipitation will flow off the mine pits or be transpired by the

vegetation. This will significantly reduce the water flow into the Pits and underground workings.

Comment 33:
Information on how the materials will be compacted in the pits is critical in evaluating the effectiveness of the remedy. If the materials are not properly compacted, then settlement will occur. Settlement will cause cracking in the cap, which in turn will cause water and oxygen infiltration, causing AMD generation.

Response:
The material was placed in the Mine Pits in horizontal lifts of 5-foot thickness. Compaction of waste material placed in the Mine Pits was achieved by equipment travel during placement. Equipment travel was routed so to compact the material evenly. Waste placed along the perimeter of the Mine Pits were placed in horizontal lifts of 2-foot thickness and compacted by 6 passes of a tamping roller.

Comment 34:
An estimate of the water budget through the Mine Pits before and after capping should be included in the FFS for proper evaluation of this alternative.

Response:
Ecology & Environment, Inc. of Denver, Colorado, in their July 1993 EE/CA has estimated that the net precipitation into the mine pits to be 72 million gallons per year. In their alternative that utilizes back-filling the pits and capping, approximately 50 million gallons (69%) of this would be runoff and not contact the waste rock.

Comment 35:
EPA does not explain if, based on a surface water management plan, the resulting increased runoff originating from South Mountain will constitute a potentially significant source of metals loading. As a result, it can only be assumed that the cost of such surface water management plan is not accounted for in the costing of such an alternative.

Response:
Surface water runoff from South Mountain could potentially be a source of AMD if the runoff comes into contact with materials that have the potential to generate AMD. The proposed plan only addresses storm water management for the CWP, BMD, SDI, and the Mine Pits. A comprehensive storm water management plan is being developed and may be part of EPA's Final Remedial Action(s) for the Site.

Comment 36:
Need ground water control plan to prevent inundation of wastes in pit. Figure 6 of the Reynolds Adit Control Program (10/94) shows that the water level has risen above bottom elevation of the pits. In the event of requiring water level control by discharge from the Reynolds Adit, the water removed should be treated.

Response:
A ground water study will be started in 1995. The results of this study will be used to support the final remedial strategy at the Site. Alternatives that may be considered include flooding the waste in the pits and controlling the water level in the mountain by releasing water from the Reynolds Adit valve. Flooding acid generating mining waste is common practice. Flooding waste controls the generation of AMD by reducing the availability of oxygen, a require element for the generation of AMD. If the water level in the mountain is to be controlled by discharge from the Reynolds Adit valve, the water will be treated if necessary to meet discharge limits.

Comment 36:
EPA has not assessed the homogeneity of the CWP and the SDI/BMD material to ensure that mixing of the materials from the CWP and the SDI/BMD will not trigger chemical reactions that will generate AMD.

Response:
AMD refers to a process by which the pH is significantly reduced in warn as it comes in contact with sulfide minerals and oxygen. The mixing of wastes will not trigger a chemical reaction that will generate AMD. The elements needed to generated AMD are present in both areas. This is demonstrated by the large volumes of AMD generated from these areas.

<u>2.2.2.7 Reclamation</u>

Comment 37:
Is there enough on-site material that can be used and is it suitable? The same stockpiles of materials are mentioned in the Reclamation Focused Feasibility Study. Is there enough for multiple remedial actions?

Response:
There is a limited amount of on-site materials for capping and final overall site reclamation. Topsoils intended for use as a growth medium will have to be amended with soil conditioners, modifiers, fertilizers, etc. EPA expects that, with proper planning and use of amendments, sufficient material is available for all site remedial activities.

Comment 38:
The FFS indicates that amendments will be added to the footprint of the CWP prior to revegetation. However, the FFS does not provide a discussion of the quantity or the type of amendments that will be used.

Response:
The amount and type of amendments that will be used to promote growth of vegetation and prevent AMD will be determined during the remedial design. EPA will make the design available to the public for review and comment when the 90% design document is developed.

2.3 Summary and Response to General Comments

Introduction On August 16, 1994, the United States Environmental Protection Agency (EPA), Region VIII (EPA), issued four Focused Feasibility Studies (FFS) relating to proposed remedial action work at the Summitville Mining Site. These four FFSs relate to: (1) Cropsy Waste Pile, Summitville Dam Impoundment, Beaver Mud Dump and Mine Pits; (2) Heap Leach Pad; (3) Water Treatment; and, (4) Site Reclamation EPA requested public comment on the four FFSs and extended the deadline for comment to October 24, 1994.

Comment 1:
A number of commenters complained that some of the alternatives evaluated by EPA in these FFSs are already being implemented without EPA having followed the remedy selection and public participation procedures of the NCP.

In particular, various commenters objected to the continued placement of the Cropsy Waste Pile into the Mine Pits pursuant to an emergency-like schedule, despite public comment on EPA's previously issued Engineering Evaluation/Cost Analysis (EE/CA). This prior public comment stated such action was inappropriate because EPA did not consider the feasibility of capping the Cropsy Waste Pile in its original location and EPA failed to consider potential short and long term impacts on AMD. Commenters believe removal of the Cropsy Waste Pile and its placement in the Mine Fits will exacerbate site conditions.

In spite of these public comments, EPA awarded a contract in July 1994 to complete the excavation and relocation of the CWP, B1VID and SDI into the Mine Pits according to the EE/CA and Action Memorandum. Commenters now object to EPA selecting the placement of the CWP, BMD and SDI into the Mine Fits as a remedial action alternative. Commenters have suggested that by selecting the EE/CA response action as the interim remedial action, EPA has "pre-selected" the remedial action for the Cropsy Waste Pile and has circumvented the public participation procedures mandated by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA) and the National Contingency Plan (NCP).

Commenters note that both CERCLA and the NCP establish specific steps and procedures that EPA must follow in selection a remedy for all or a portion of a CERCLA Site. See. generally 42 U.S.C. 9604, 9621; 40 C.F.R. 300.430 and claim that EPA has not followed the NCP procedures. The commenter states that EPA justifies the implementation of the allegedly "pre-selected" remedy by arguing that the public participation undertaken during the EE/CA process last summer satisfies the public's right to participate in the remedial selection process for the Target Areas.

Response:
Excavation and consolidation activities associated with CWP, BMD, SDI, and Mine Pit were initiated under an EPA non-time critical removal action pursuant to Section 300.415 of the NCP. Such removal activities are appropriate when, among other things, "excavation, consolidation, or removal of highly contaminated soils from drainage or other areas ... will reduce the spread of, or direct contact with, the contamination." See Section 300.415(d)(6) of the NCP at 55 Fed Reg. 8843 (March 8, 1990). Once EPA determines such removal actions are appropriate, response actions shall begin as soon as possible to abate, prevent, minimize or eliminate the threat posed by the contamination to public health, welfare of the environment. (See Section 300.415(b)(3) of the NCP at 55 Fed. Reg. 8843 (March 8, 1990).)

According to the NCP, if a six-month planning period exists before EPA initiates a removal action, EPA must conduct an Engineering Evaluation/Cost Analysis (EE/CA). This analysis, although not as extensive as a Remedial Investigation/Feasibility Study, identifies the objectives of the removal action and analyzes the various alternatives that may be used to meet these objectives, based on the alternative's cost, implementability and effectiveness. The EE/CA is then released for public comment, according to the public participation procedures established in Section 300.415(m)(4). Finally, after a minimum 30-day public comment period, EPA issues an Action Memorandum which documents EPA's selection of an appropriate non-time critical removal response action. See also, "Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA." EPA/540-R-93-057, Publication 9360.0-32 (August 1993).

EPA meticulously followed the NCP-prescribed procedure in proposing and selecting the EE/CA-based non-time critical removal for the CWP, BMD, SDI, and Mine Pit (collectively, the Target Area). EPA published its EE/CA in July of 1993, solicited and accepted public comments on the EE/CA until early September of 1993, responded to those comments in its "Responsiveness Summary to the Engineering Evaluation/Cost Analysis for the Cropsy Waste Pile, Beaver Mud Dump, the Cleveland Cliffs Tailings Pond (now called the Summitville Dam Impoundment), and Mine Pits, Summitville minesite, Rio Grande County, Colorado," and issued its Action Memorandum on September 24, 1993. EPA let a contract to begin implementation of this part of the EE/CA-based removal action in July 1994.

EPA is not arguing that providing the public the opportunity to comment on the EE/CA is sufficient to substitute for soliciting public comment on the Target Area FFS and Proposed Plan EPA agrees that the NCP does not allow EPA to satisfy its public participation obligations for a proposed plan by reference to another document EPA also agrees that the analysis EPA conducts to evaluate removal alternatives differs greatly from the analysis conducted to evaluate remedial alternatives. For non-time critical removals, EPA evaluates the alternatives in terms of effectiveness, implementability and cost alone. The evaluation of remedial alternative is conducted using the nine criteria of Section 300.430 of the NCP. The two sets of evaluation criteria are not synonymous.

EPA, however, did fully comply with the NCP-prescribed procedures for screening, proposing and selecting remedial alternatives for the Target Areas in its Focused Feasibility Study, Proposed Plan, and Interim Record of Decision (ROD). The removal alternative previously selected in the Action Memorandum was one of the alternatives evaluated during EPA's remedy selection process. EPA took public comment on the relative merits of all alternatives evaluated in the FFS vis-a-vis the nine NCP criteria and proposed its preferred alternative in a Proposed Plan, issued in accordance with Section 117 of CERCLA. The alternative previously selected in the Action Memorandum, as expanded in the FFS and Proposed Plan, met the threshold remedy selection criteria of the NCP and provided the best balance of the NCP's "balancing" and "modifying" criteria. It was selected as the appropriate remedial action in the Interim ROD for the CWP. In accordance of the remedy selection criteria of Section 300.430(e) and (f) of the NCP.

EPA therefore selected both the EE/CA-based removal action and interim remedial action according to the different, applicable standards and procedures of the NCP. The fact that the two response actions are similar does not make the implementation of the previously selected removal action illegal or invalid. Moreover, with the letting of the July 1994 contract, EPA was merely initiating the implementation of its validly selected removal action. EPA's publication of the Target Areas FFS and Proposed Plan has no bearing on and should not interfere with EPA going forward with this removal action.

Comment 2:
One commenter strongly recommends that EPA delay removal of the Cropsy Waste Pile until all the potential ramifications have been properly evaluated by the public and by competent technical consultants. Such an evaluation should be conducted after the "Use Attainability Study," which will characterize and evaluate downstream effects from the Site, is completed. The commenter believes there is no reason to implement this remedy on an expedited schedule.

Comment 2:
The Use Attainability Study is being completed by the State of Colorado, Division of Minerals and Geology. The findings of this study will be incorporated into EPA's final response action for the Site. In the meantime, EPA believes the environmental benefits that will be gained from the implementation of interim remedial actions at the Site far outweigh the continued releases of mine waste for the Cropsy Pile.

Commenters requested an explanation of EPA's rationale for issuing interim rather than final RODs. These commenters feel EPA has no legal or technical basis for issuing IRODs and that there will be additional costs associated with first implementing an interim remedy prior to making a final remedy selection. They also expressed the belief that some of the interim remedial actions may actually exacerbate site conditions and contamination or may prove ultimately incompatible with final remedial action(s) for the Site.

Response:
According to EPA guidance, interim remedial actions are appropriate to "take quick action to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed." (See "Guide to Developing Superfund No Action, Interim Action and Contingency Remedy RODs," US EPA, OSWER Publication 9355.3-02FS-3 (April 1991), at p. 5.)

Deterioration of site conditions will lead to continued and heightened exposure of sensitive human and ecological populations to heavy metals and chemicals (e.g. cyanide) used by Galactic and others in their mining operations. The IRODs institute temporary measures to stabilize the Site and prevent further migration of contaminants of concern from the Site into surrounding soil, air and water media. Further, the types of interim actions selected in the IRODs, such as the relocation of contamination from one portion of the Site (CWP) to another (Mine Pits) and the installation of caps to prevent further migration of contaminants are exactly the types of response EPA guidance states are appropriate to implement as interim remedial actions. See, "Interim Final Guidance on Preparing Superfund Decision Documents," OSWER Directive 9355.3-02 (June 1989), at Chapter 9.

Given the existing Site conditions, EPA is certain that filling the Mine Pits will significantly reduce the flow into the Pits and prevent discharges of acid from the Mine Pits into underground workings and ground water. Relocating other mine waste features such as the CWP, BMD, and SDI to the Mine Pit will also mitigate these areas as sources of AMD. Capping the Mine Pits will serve to eliminate or significantly reduce the movement of contaminants of concern through water and air pathways. Treatment of surface water and detoxifying the Heap Leach Pad will eliminate releases of metals and cyanide: Overall, the implementation of interim response actions will quickly reduce the imminent threats to human and environment receptors at and around the Summitville minesite. EPA will also continue to monitor the progress of these remedies in eliminating or reducing the release of hazardous substances from the Site and will determine what, if any, final remedial actions are necessary to address the remaining risks at the Site.

Comment 4:
Many commenters sought clarification which applicable or relevant and appropriate requirements (ARARs) of federal and state statutes and regulations must be complied with for remedial actions at the Site. Commenters wanted an identification of which ARARs will be met with by the interim actions and which ARARs will be waived. One commenter cautions against the use of "Technical Practicability Waivers" as shortcuts in the remediation.

Response:
The ARARs clarification is provided in the specific Responsiveness Summary on ARARs. Each IROD also identifies the relevant portions of federal and state requirements are being complied with or waived in the implementation of the interim remedial actions. Commenter should be assured that all ARARs waived with the selection of interim remedial action will be re-evaluated for the final remedial action(s) for the Site.

One commenter noted that each of the FFSs states an "observational site approach" will be taken as part of EPA's interim remedial actions. This commenter believes that an observational approach may be an effective approach to site remediation, provided that all the possible outcomes of the proposed action are identified, evaluated and monitored. The commenter suggested that for potential outcomes that may have adverse consequences, the impacts associated with those outcomes and the probability of their occurrence must be qualitatively defined. If adverse consequences are likely, or that site conditions could be make more complicated and problematic, then implementation of the proposed remedy must be reconsidered. Finally, the commenter declared implementation of a remedial action without an overall plan for each dealing with range of the potential outcomes is inconsistent with a responsible observational approach at a complex site like the Summitville Minesite.

Response:
As discussed in the "Analysis of Alternatives" section in each of the IRODs, EPA has considered all the relative merits and detriments of the potential remedial actions evaluated. "Potential adverse consequences" of implementing the alternatives was evaluated, as was EPA's ability to deal with these potential adverse impacts when EPA reviewed the overall protection to human health and the environment, long-term effectiveness and permanence, short-term effectiveness, implementability criteria of the NCP. The interim response actions selected in the IRODs represent the alternatives that provide the best balance of meeting these criteria. EPA will employ the "observational approach" to continue to evaluate these interim remedial actions' effectiveness in meeting these NCP criteria, EPA's RAO and performance standards and to determine what, if any, additional final remedial actions are necessary to ensure that human health and the environment are protected against unacceptable risks posed by hazardous substances remaining at the Site.

Comment 6:
A number of commenters are concerned about EPA's estimate of costs to be expended at the Summitville Site are too low. Commenters have calculated those costs (both removal and remedial) as exceeding EPA's $120 million estimate. They are concerned that the staggering amounts for interim response do not include the cost of the final remedy or remedial investigation/feasibility studies presently being conducted at the Site.

Response:
The commenters are correct in their observation that EPA's initial costs estimate has been exceeded with the collective costs of the interim remedial actions selected in the IRODs. The alternatives selected in the IRODs were screened for cost, and EPA believes that they are cost-effective. As studies at the Site provide additional information and as remedial actions are implemented, costs for remediation of the Site will continue to be reassessed.

Comment 7:
Commenters object to the backfilling of the Mine Pits and the plugging of the Reynolds Adit, since in their view, these actions preclude a future beneficial use, that of re-mining. The commenters believe that EPA's remediation activities should be immediately terminated or suspended until the impact to future mining uses can be thoroughly evaluated.

Response:
None of the proposed or completed EPA activities preclude further mining activities at the Site. However, any future mining activities must be consistent with and not interfere with the response actions EPA has implemented at the Site. EPA's remedial actions are intended to prevent the exposure of humans and ecological populations to hazardous substances. Any future mining activities that do not exposure these populations to hazardous substances may be acceptable to EPA. It is anticipated, however, that EPA will have to review any future mining plans to ensure the protection of human health and the environment.

Comment 8:
Commenters object to EPA's lack of a comprehensive Record of Decision for the Site and the implementation of parallel or isolated and disjointed actions at the Site without any overall plan or remedial strategy for the Site. To remedy this lack of coordination, the commenters suggest that an independent board of technical experts review and select Site response actions.

Response:
EPA believes that the interim remedial actions selected in the IRODs provide a comprehensive, coordinated approach to addressing the risks at the Site. Specifically, EPA believes that all the remedial measures to be implemented according to the IRODs will go a long way in improving sitewide water quality by controlling surface runon and runoff, erosion, leaching and metals and other contaminant loadings to the Alamosa River.

Empowering an independent board of technical experts to review and select remedial actions at the Site is improper under the Superfund law. Congress explicitly charged EPA with the authority to select response actions to cleanup releases of hazardous substances under the CERCLA Section 121 of CERCLA. In fact, this section of CERCLA unequivocally states that "the President shall select appropriate remedial actions determined to be necessary to be carried out under section 104 or secured under section 106 which are in accordance with this section, and to the extent practicable, the national contingency plan..." [emphasis added]. The President has delegated that authority to select response actions at Superfund sites to the Administrator of EPA. The procedures the Administrator must follow in selecting these cleanup actions are contained in the National Contingency Plan. **1** The NCP provides that affected and interested parties, such as States, PRP and citizens are given the opportunity to participate in the selection process, but it is clear that the Administrator retains the responsibility to select the appropriate remedy.

Thus, while EPA welcomes input from the community and neutral third parties concerning the actual health risks from lead-contaminated mining was, EPA cannot abrogate statutory responsibility to be the decision maker in selecting remedial actions for Superfund sites. EPA can also not allow a third party to determine the appropriate scope of EPA's remediation plan, since it is our experience in identifying health and environmental risks and desiring the remedies to address them that Congress relied upon when it empowered us with the authority to select and implement remedial actions under Superfund.

Comment 9:
One commenter noted that downstream impacts are currently being ignored and avoided despite the above stated RAO. Avoidance of downstream impacts adversely affects Terrace Reservoir, household and municipal wells and allows agricultural land to further degrade.

Response:
Due to the Chandler Adit drainage, all downstream targets are being addressed as quickly as possible. All three areas mentioned above are pan of major research efforts included in the justification of remedial actions at the Site. Terrace Reservoir is currently undergoing a study conducted by the U.S. Geological Survey. Agricultural lands have undergone several studies, including those conducted by Colorado State University. With regard to household water use, local water supplies have been sampled twice and are undergoing long-term water sampling.

Comment 10:
The same commenter stated a site drainage plan, which provides control for surface/subsurface drainage, storm water and sedimentation management and nonpoint source collection/treatment, is needed.

[1 See, e.g. Section 120(e) (4) of CERCLA (where if the head of the relevant federal agency and the Administrator of EPA cannot reach an agreement of the remedial action to be selected, the Administrator selects the remedy).]

Response:
A site drainage plan has been implemented. A copy of the plan is available in the Administrative Record.

Comment 11:
One commenter identified a need for a waste management plan.

Response:
A number of the IRODs have elements is designed to meet waste management ARARs. The Sampling and Analysis Plans describe how investigative derived wastes are managed. Also, used oil is being recycled and, as stated in the Focused Feasibility Study, sludge produced on-site is being recycled for metals recovery.

Comment 12:
One commenter is concerned that EPA does not have sufficient date to establish the Summitville Dam Impoundment (SDI) as a source of sulfide-rich tailings and metals-laden acidic water discharged to Wightman Fork. The lack of this data calls into question the need to remediate the SDI at all, or at least the nature and extent of such remediation. The commenter suggests EPA collect additional data regarding the nature and extent of contamination at the BMD and SDI before proceeding with remediation of these areas.

Response:
Historically, the SDI and BMD area have been of significant concern to regulators from the State. Water discharges emanating from these materials has been recorded as being of poor quality. Based on existing data, historical precedent, and current sampling and analysis information, EPA determined that the SDI and BMD are significant contributors of man-made AMD at the Site. Data collected by Anaconda prior to SCMCI operations states that the mill tailings disposed of in this area are strong AMD generators. Movement of these sources and the Cropsy Waste Pile to the Mine Pits allows capping of four AMD sources in one action.

One commenter argues that the FFSs and Proposed Plans fails to comply with the NCP because: (1) these documents evaluate the "No Action" alternative for the Site as a whole, rather than by the subject matter of each interim remedial action, (2) they fail to consider naturally-occurring background concentrations of metals and acids in EPA's analysis of alternatives, and (3) compliance with ARARs and/or ARAR waivers have not been identified with any amount of specificity.

Response:
Alternative No. 1 for each of the Focused Feasibility Studies is a No-Action Alternative related to that particular portion or media of the Site.

Naturally-occurring background levels of metals and acids were taken into account when evaluating ARARs for the interim remedial actions. For example, EPA determined it was appropriate to waive the Segment 3b stream classification as an applicable requirement that must be met by the IRODs because of the historic contributions of metals and acids from naturally-occurring sources. EPA will determine if this ARAR should be waived in any final ROD(s) for the Site when additional background and load reduction information is collected.

Cleveland-Cliffs Iron Co. and Union Pacific Resources Company submitted information regarding their (or their predecessor-in-interest's) operations at the Site, their analysis of the current state of CERCLA case law related to liability and legal arguments evaluating their liability at the Site. These commenters also requested that EPA refer to the area adjacent to the BMD, which EPA has referred to as the Cleveland-Cliffs Tailings Pond, as the Summitville Dam Impoundment or some similar appellation.

Response:
While EPA appreciates information regarding parties' prior activities at the Site, particularly if this information supplements EPA's CERCLA 104(e) information requests or helps EPA to characterize the wastes at the Site, EPA believes a submission that purports to provide comments on an FFS and Proposed Plan is an inappropriate forum to state one's view of its liability at the Site. Such comments are more appropriately submitted as part of a party's response to EPA's CERCLA Section 104(e) request, EPA's Notice Letter or in confidential settlement correspondence between EPA and the submitting party. A specific response to Cleveland-Cliff/UPRC's legal arguments will be forwarded under separate cover.

Without any qualitative judgment on the merits of Cleveland-Cliff/UPRC's legal arguments, EPA nonetheless agrees to here refer to the area below the Beaver Mud Dump as the Summitville Damn Impoundment. Corresponding changes to this nomenclature will be made in all future EPA documents.

RESPONSIVENESS SUMMARY: GENERAL WRITTEN COMMENTS RECEIVED FROM CITIZENS AT LARGE OF THE SAN LUIS VALLEY

These written comments represent the universe of comments received through the end of the public comment period.

Comment 15:
To whom it may concern: My name is Roger Gallegos I have lived in the San Luffs Valley just about all my life. Before the Summitville Mine came to exist, life was good. After they exploited the government and us, life became much more difficult. Take for instance, when we would water our fields, we could catch fish in our ditches. Another thing I have noticed is the crop yield. Before the mine came in my meadow would yield 3000 to 3200 bales of hay. When the mine had there spills I yielded 1642 bales. My best year while the water quality improved was about 2853 bales. Now this may not sound important, but it is. I used to sell hay for a living, and now I feed it to my cows. The mine has hurt my family in the pocketbook. We have all been hurt by the mine in this community. The government should never have let them start to begin with. Galactic Mining should be made responsible for the clean up. then the Government for allowing them to do this. Since the mining company has gotten away with this, we should not be made to suffer for other peoples mistakes. I say Summitville should be cleaned up and restored, and our water be put back to normal. My Great Grandfather made a living with my ranch, as did my Grandfather and Dad. I want my kids and their kids to continue making a living on what is theirs. They have that right, and not be forced to suffer for what someone else was allowed to do. I myself believe the plan to filter the water down below where the creeks meet, is the best idea. That system for 8 million, could save money and work.
Thank you for listening. The Gallegos Family. [Letter; undated; no other data given]

Comment 16:
Dear Ms. Williams: As a farmland owner with land irrigated from the Alamosa River I am deeply concerned and worried what the continued use of the contaminated water will eventually do, not only to the land, drinking water from the wells, but also to the livestock and products which are ultimately consumed by the general public. There are those who say it has no ill effects on crops or livestock - but for how long. I do know it has played havoc with the steel structures in the irrigation system. I'm under the Capulin Ditch and we have had to spend over $40,000.00 replacing all steel structures. I may say that I was Water Commissioner for this district and know the Alamosa River quite well In this time I never saw when so many irrigation structures all deteriorated in such short time. As for those who say there never were any fish in the Alamosa River - it is not true. Why else would the Game and Fish Department consider it a fishing stream. People would ice fish all winter in the Terrace Reservoir up to the time the mine started to dump the mess into the stream. I have lived here all my life and can remember when we were little Dad would take us fishing there. As for the different options to solve the problem it seems to me one that would treat all the water before it got into the Alamosa River would be the one - probably in just one pond. Thank you
Sincerely, Leo B. Gonzales [Letter; dated Oct. 19, 1994; address and phone number given]

Comment 17:
Dear Ms. Williams & EPA Summitville Team: Although I may be writing too late for the case record, perhaps your comment period's been extended; in any case, the information leading me to voice my concerns reached me after the original deadline. Your recommended plans generally seem to stress reliance on systems that won't need too much up-keep once set in place. The biotreatment aspect sounds favorable. However, it has come to my attention that "caps" or "plugs" contributed to poorer water quality late in this year's irrigation season, since the caps rechanneled contaminated water into other drainage channels that weren't serviced by your water treatment facilities. This indicates two planning factors to me: 1. you'll want to assess where water will eventually seep out before you start filling the mine pits with waste materials that are likely to displace ground water, and 2. it would make most sense to locate your water treatment unit(s) as far downgradient as possible, even if this entails relocation of the existing facilities. I was also surprised that the reclamation plan *mentions no reseeding or tree transplanting details. Although it may or may not mean anything scientifically, I notice that the Alamosa creekbed's rocks have a much less "rusty" surface coloration near my house than they ever did during SMC's last four years. Thanks for your efforts.
Sincerely, Paul Sinder [Letter;, dated 9/27/94; address given]

Comment 18:
To Laura Williams: I am writing to voice my concern on the clean-up efforts being taken at the Summitville Minesite. Mainly, I would like to state that I fully support the alternatives researched and proposed to you by the T.A.G. committee. I hope the E.P.A. system is flexible and the T.A.G. proposals not only be reviewed, but also implemented. I thought the public meeting on October 12th, was very informative and positive. It led me to believe that, although you have plans made and on paper, you are open to suggestions, criticism and change. The T.A.G. proposal on water treatment is to my opinion a priority. It will make an immediate difference in the water quality coming downstream and into our valley. I do hope this will be realized as soon as possible, it seems common sense. Looking at the T.A.G. proposals, I think they have found several solutions which promise more lasting and better results (and in some eases a smaller price

tag). A question I have too, is whether the E.C.C has the experience to tackle the job up there. How many other experts and companies have been approached for their expertise and advice? I am optimistic that you will find a way of working together with the T.A.G. team in finding the Fight solutions. I appreciate the work you are doing and am keeping my fingers crossed that all goes well I realize it's a tough and very complicated job.
Sincerely Lisa ter Kuile A rural resident surrounded by Terrace irrigated land. [Letter; undated; no other data given]

Comment 19:
Dear Ms. Williams: We want to support the recommendations made by the TAG for the Summitville Minesite. We are concerned here in Conejos County about water quality and the long term effects of the Summitville Minesite. We want the agricultural community in our county to remain stable so our role as County Commissioners must look toward the future and address the long term consequences connected with this site. Please take the TAG recommendations seriously, the quality of our land and water will determine the future of our community.
Sincerely, Le Roy Velazquez, Chairman Conejos County Commissioners [Letter; dated October 18, 1994; typed on Conejos County Government letterhead]

Comment 20:
Dear Ms. Williams: We, as Board of Directors of the Valle del Sol Community Center in Capulin, are extremely concerned about the Summitville Minesite and its continuation clean-up efforts. We are very interested in the quality of our water for our homes as well as for our farms. We support the enclosure made by the Technical Assistance Grant Committee. We have showed our interest by making our community center available for meetings so that the community will continue to be informed and to participate in the process. If there is anything else we can be doing, please let us know. We are fully aware that the results of the Summitville Minesite on the quality of our water will determine our livelihood in Capulin.
Sincerely, Valle del Sol Community Center Board of Directors. [Letter; dated October 18, 1994; five signatures, spelling approximate: Rev. Randy Brennig, Delma Ramirez, James A. Quintana, Cindy Medina, Julia Gomez-Nuanes; typed on Valle del Sol Community Center letterhead]

Comment 21:
Dear Ms. Williams, After reading the TAG newsletter and listening to Maya ter Kuile, I have some misgivings about the E.P.A. plans for Summitville. The TAG suggestions surely seem much more reasonable and straight forward than the EPA's approach. Their cost effectiveness seems much more desirable also. As a new resident to the area I urge you to look again at what has occurred to the Alamosa River, consider all of us who drink and irrigate in this area and rethink your approach to what you (i.e. EPA) are doing at Summitville.
Thank you [Letter; dated 21 Oct 94; unreadable signature; address given]

Comment 22:
Dear Ms. Williams, I am writing you to voice my support for the Technical Assistance Grant Committee's response to the EPA's action plan for clean-up of the Summitville Minesite. I encourage your department to work with the TAG Committee for a thorough clean-up operation with SLV citizen input.
Thank you for your consideration - Sincerely, Susan Sawyer [Letter-, undated; address given]

Comment 23:
Dear Ms. Laura Williams, I am writing concerning the Summitville mine clean-up. I attended and appreciated the meeting on Oct. 12, where the EPA presented their progress and future for clean-up, and the TAG presented their answer and their suggestions on how to improve the current trend. I have heard and read both sides of the issue. I, as do the residents of this community, appreciate the work and the concern that the EPA has shown to clean up this mess. Receiving Superfund status at such a fast rate was excellent. We are really grateful to the organization. My concern, as most of the community's, is the form in which the clean-up is being performed. Some things were done in obvious haste due to the situation and the consequences are now being observed i.e.: the Reynolds adit plug and the Chandler adit leak. The best thing to do, I believe, is to sit back and really assess the situation before any more mistakes are made. The TAG has gone up there, researched the situation, consulted with experts and presented a different point of view. I listened to both sides (EPA versus TAG) and came to the conclusion that the TAG had much better and faster results than the current method. I was much more comfortable with the research done by the TAG group, seeing that it was done more in depth and with well experienced experts. The cost, being of great concern to many, would also be less if you reviewed the TAG group's point of view. There are many that say that this river has always been polluted. Most of these people do not reside close to this river or even in the vicinity. Many live in other counties. I, as many other people in this community did, fished, not only in this river but also on Terrace Reservoir, not too long ago (1984-85). This river has not always been polluted. Maybe it's had it's ups and downs, but it has never been dead. Not only do fish not exist any more but algae can't even grow any longer. I am stating this because I have heard of people wanting the EPA to pull out, saying that this river has always been polluted. These people do not know the facts and magnitude of the damage that can occur and won't see into the future at what will happen to this valley if nothing is done. I really hope that you really take careful consideration on all our letters, and take the TAG group's suggestions seriously and

implement their ideas. Thank you for your time and hope you will have another update meeting soon. Sincerely, Nitschka ter Kuile and Steven Miller Home and Land Owners, 1/4 mile from Alamosa River. [Letter; dated Oct 20, 1994; other data not given]

Dear Ms. Williams: I have reviewed the TAG committee's recent newsletter and have discussed the feasibility studies that were done and submitted to the E.P.A. with a TAG committee member. I would like to comment. First, I would like to tell you that our farm has been in our family for five generations. It is irrigated with water from the Alamosa river which flows through our farm. My husband and I worked for over forty years to purchase various parcels of land to make up what is now the present 435 acres. It would be a severe financial loss to my family and to the other farm families here to be forced to abandon our farms should the water quality of the Alamosa become incompatible with safe crop and livestock production. I feel the TAG committee has done an excellent job in their feasibility study and in the suggestions they have made. I urge the E.P.A. to consider water treatment to become a top priority and to take the TAG committee's suggestion to build a water treatment plant at the bottom of the Minesite, rather than to continue with the current treatment plan, which is not only more costly, but would delay the treatment of the water in time to prevent damage to thousands of acres of farmland. Sincerely yours, Leola T. Miller [Letter; dated October 20, 1994; address given]

EPA RESPONSE TO WR COMMENTS RECEIVED FROM CITIZENS AT LARGE OF THE SAN LUIS VALLEY

EPA will address citizen written comments in one response. All but one of the citizen comments expressed direct concern with water quality issues as related to water quality conditions in the Alamosa River resulting from mining activities at the Summitville Mine. Many citizen comments received expressed support for the TAG committees' recommendations, particularly regarding the location of the existing on-site Water Treatment Plant and associated costs.

EPA appreciates the fact that citizens have taken the time to attend the public meetings and review the proposed plans and recommendations. EPA feels that citizen input is a component of the decision making process and the concerns raised regarding water quality are valid and deserve consideration. EPA further recognizes the time and effort expended by the TAG to evaluate the proposed plans and develop constructive recommendations. As with citizen involvement, EPA realizes that impartial technical assistance provides value in the decision making process.

EPA is also cognizant of water quality issues which are central to human health, agricultural impacts, and activities related to fishing, recreational or otherwise. EPA agrees with citizen concerns especially as they relate to water quality.

It is the intent of EPA to integrate recommendations made by the TAG into the final consideration of alternatives. These may be especially pertinent to specific elements of the Site Reclamation options. In a letter from the Forest Supervisor of the San Juan/Rio Grande National Forest dated October 17, 1994, the USDA Forest Service expressed agreement-in-principle with the preferred alternative #4 for site reclamation, stating that "it certainly seems to be the most reasonable and cost effective in terms of restoring the area to a productive capacity".

The letter also stipulates that, pursuant to the current Master MOU (Memorandum of Understanding) between EPA and the Forest Service, the Forest Service agreed to "provide expertise related to natural resource management and protection...". In response to the proposed plan for site reclamation, the Forest Service has offered expertise, "particularly in the area of soil/surface reclamation", based upon its "considerable experience in conducting high elevation reclamation". EPA feels that recommendations made by the Forest Service are valuable and will be carefully considered in final selection of specific elements of the reclamation plan, particularly those relevant to revegetation.

Regarding the alternatives for water treatment, EPA recognizes TAG concerns in discriminating between Alternative 5 and Alternative 6 and TAG suggested modifications to Alternative 6, EPA further recognizes similarities between the two alternatives. EPA acknowledges TAG efforts in acquiring cost estimates from potential vendors. Relevant to costs for constructing a new water treatment facility, EPA is cognizant of potential difficulties associated with acquiring broad-based cost estimates from potential vendors who may or may not be as familiar with site- specific conditions. Site specific conditions can dramatically affect proposed costs regardless of the experience and intentions of potential constructors. However, EPA will take TAG recommendations under advisement and continue to seek comment from TAG members.

2.4 Summary and Response to ARARs Comments

Comment 1:
A number of commenters noted that the ground water ARARs are also poorly defined, causing EPA difficulty in determining whether groundwater ARARs can be met by EPA remedial activities. These commenters challenged

EPA's adoption of surface water quality standards for ground water resources, citing a lack of data. Commenters noted the fact that surface water consists of snow melt and storm water runoff, plus baseflow contributions from ground water sources. The commenter argued the Site has historically exhibited high total dissolved solids (TDS) in the ground water and that EPA has not adequately characterized other background water quality conditions. Water quality data from surface water sources typically shows less TDS than from ground water tributary sources. The commenter believes EPA has failed to account for this data in selecting ground water quality standards.

Response:
EPA has determined that the classification system prescribed by the Colorado Ground Water Standards is applicable or relevant and appropriate to assignment of standards to ground water at Superfund sites within Colorado. Since the Colorado Water Quality Commission has yet to classify the Sitewide ground water, numeric ground water standards are not currently applicable or relevant and appropriate to ground water quality at the Site. The interim ground water narrative standard adopted by the Colorado Water Quality Control Commission on July 29, 1994, however, is applicable to the Site. This standard, which became effective on August 30, 1994, requires that the ambient water quality as of January 31, 1994, continues to be met. This ARAR will be met by compliance with EPA's interim action levels and with all surface water quality ARARs, as discussed in each of the IRODs.

EPA, like the commenter, moreover, recognizes the hydrological interconection between the surface and ground water flows at the Site, particularly during base flow periods. EPA expects, therefore, that once the WQCC completes its use attainability study and classifies Site ground water, this classification will be applicable to the Site. This ARAR will be attained by the final remedial action(s) for the Site.

Comments 2:
Two commenters objected to the use of RCRA Subtitle C performance standards and design criteria for containment of existing waste rock, spent ore, and tailings at the Site.

Response:
While EPA agrees that RCRA Subtitle C requirements are not applicable to "Bevill exempt" wastes, i.e., those from the "extraction, beneficiation, and processing of ores and minerals," EPA has determined that RCRA Subtitle C requirements may be relevant and appropriate to actions at CERCLA mining sites if the mine waste materials are sufficiently similar to RCRA hazardous waste, particularly if the subject wastes fail the Toxicity Characteristics Leachibility Procedure (TCLP) or exhibit other characteristics of RCRA hazardous wastes (e.g., low pH). (See "Superfund Guide to RCRA Management Requirements for Mineral Processing Wastes, 2nd Edition," OERR Directive 9347.3a-12 (August 1991).) Further, if the disposal activity involves the use of a waste management unit sufficiently similar to a RCRA regulated unit, and the unit is to receive wastes sufficiently similar to RCRA hazardous wastes, the RCRA Subtitle C requirements pertaining to that type of waste management unit would be relevant and appropriate. (See 55 Fed. Reg. 87630.)

The portions of the RCRA Subtitle C performance standards and design criteria that are relevant and appropriate to EPA's interim remedial actions at the Summitville site are identified in the CWP, HLP and Reclamation IRODs.

Comment 3:
Another commenter noted that it was difficult to provide meaningful comment on the ARARs for the CWP, BMD, SDI and the Mine Pits (collectively, the Target Areas) because of EPA's vague and incomplete analysis of these standards in the CWP FFS.

The commenter attributed thin vagueness to EPA's lack of discussion of how and why it identified, adopted, or rejected specific potential ARARs and EPA's failure to identify the ARARs, or portions thereof, that must be met by each interim remedial action.

Response:
While EPA was trying to promote efficiency by using the generic ARARs addendum to the HLP FFS as a means to identify the universe of ARARs for all Site remedial actions, EPA recognizes that this approach may have led to confusion over which ARARs were applicable or relevant and appropriate for each IROD. In response to this comment, EPA further defined the ARARs from Federal and State laws or regulations which must be met by any alternative implemented as the CWP interim remedial action. The ARARs for the Target Areas eau be found in Section 1.5.4 of the CWP IROD. Since the sitewide ARARs have already been identified in the "ARARs Addendum to the HLP Focused Feasibility Study Report," this further refinement of ARARs as they relate to the CWP IROD represents only a minor change to the CWP FFS and Proposed Plan. Consistent with its "Interim Guidance on Preparing Superfund Decision Documents", OSWER Directive 9355.3-02 (June 1989), EPA has determined that this minor change will have little or no impact on the overall scope, performance, or cost of each alternative as originally presented in the CWP FFS or Proposed Plan.

Commenters question EPA's use of the most stringent stream classification - that of Segment 3b of the Alamosa River - as the controlling surface water and ground water quality ARAR. They state EPA has adequately explained why it has selected this stream classification as the "controlling" standard. Further, commenters argue that the numeric criteria based on the most stringent stream classification does not account for the lower classifications of other stream segments or for high background levels of copper, zinc and other hazardous substances in the Wightman Fork and Alamosa River which are the result of naturally occurring oxidation and transport processes acting upon highly mineralized, unmined and unprocessed rock in the area. EPA, they opine, cannot remediate water quality below naturally-occurring background levels. Lastly, commenters argue that the State erred in designating Segment 3b of the Alamosa River as Class 1 Cold Water Aquatic Life, and that this standard can never be attained because of background levels of metals. They suggest that EPA waive this flawed classification based on the technical impracticability of achieving these water quality standards and the State's failure to consistently apply them, as evidenced by the creation of NCLs in the permit and 1991 Settlement Agreement.

Response:
First, the commenters should understand that despite a Class 2 designation in Terrace Reservoir (Segment 8), Segment 8 carries hardness-based TVS as the ambient standards. Because the hardness in the Alamosa River decreases with increasing distance from the water treatment plant at the Summitville Site, the ambient water quality standards in Terrace Reservoir (Class 2) are more stringent than those assigned to Segment 3b (Class 1).

The commenters should also note that the WQCC originally proposed to upgrade Terrace Reservoir to Cold Water Aquatic Life Class 1 but declined because of limited data. In fact, review of Exhibit 12 to November 1, 1993 hearing held by the WQCC in Alamosa, reveals the intention to collect needed data and review suitability for upgrade to a Class 1 designation. As stated in the HLPFFS, at this time EPA believes that employing the Segment 3b standards will contribute to attaining Class 1 uses in Terrace Reservoir and should contribute to attaining the existing, more stringent, hardness-based TVS assigned to Terrace Reservoir.

As the commentor is aware, the re-evaluation of water quality standards in Colorado streams, rivers and reservoirs is an ongoing process controlled by the WQCC. In its discussion, EPA specifically recognized the inconsistencies and concluded that the Colorado Water Quality Standards (CWQs) for Segment 3b of the Alamosa River, as the applicable ARA , will serve as the numeric interim remedial action goals for the Site.

At this time EPA does not have a basis for usurping the WQCC authority to determine appropriate classification and water quality standards for the Alamosa River and its tributaries. As additional am is gathered and the effects of the interim actions are quantified, it is within the WQCC's authority to address all of the issues identified in these comments. Until that time, EPA will use the existing standards as numerical goals for the remediation.

In the HLPFFS, EPA made its intention to attain surface and ground water quality ARARs at Segment 3b of the Alamosa River clear. The attainment of the ARAR for Segment 3b will be monitored using a "bubble" approach at the downgradient boundary of the Site, monitoring point 5.5 in the Wightman Fork (WF 5.5). In this way, no single interim remedial action alone is expected to bear the burden of ARARs attainment.

Where the action-specific ARARs associated with interim remedial actions at the Summitville Site require identification of an ambient-water-quality-based-end point (i.e., NPDES point source permitting), the applicable CWQSs for Segment 3b are established using a model to back calculate compliance at WF 5.5. This modeling resulted in EPA's establishment of interim action levels (IALs).

As noted in the HLPFFS, given the active interchange typical of alluvial ground water and surface water in high mountain valleys, EPA has determined that attaining compliance with surface water quality ARARs and the ground water interim narrative standard will protect both surface and ground waters. This interchange will only compel ground water cleanup to the extent required, in combination with other actions, to amain ARARs at the point of compliance (WF 5.5) and thereby meet the standards established for Segment 3b.

The commenter should also be aware that the background concentrations of metals and acids have been considered. At the triennial review of the Rio Grande Basin the WQCC did recognize that background metals concentrations in Segment 3a can be attributed to natural acid mine drainage from Iron, Alum and Bitter Creeks. Consistent with those findings, the WQCC promulgated standards in Segment 3b which reflect the elevated background concentrations and the wider pH range documented in Segment 3a. EPA believes it has made its reliance on the WQCC's work very apparent in the table on page 3-6 of HLPFFS (see the values for chronic copper and chronic iron).

EPA did not participate in the development of the NCLs. These negotiated numbers are not duly promulgated and they are not the result of applying site specific data to duly promulgated NPDES requirements (i.e. mass balance, low flow, etc.) to establish a discharge limit. The NCLs may indicate the appropriateness of a waiver at some time in the future, but at the present EPA will reserve judgement on the use of and scope of waivers.

The EPA believes that, as an objective, the protection of the Alamosa River as habitat for a diverse range of cold water aquatic life is appropriate until the combined effects of the interim actions come into effect. Although it is impossible to precisely quantify, EPA believes that when the combined, beneficial effects of the IRODs are realized, ARARs will be attained in Segment 3b of the Alamosa River.

At that me, EPA will be able to better quantify the results and determine if additional action or waiver is required. Likewise, the WQCC will have another opportunity in three years to evaluate the results of the interim RODs and use its own use attainability authorities and ground water site-specific classifications to adjust standards accordingly.

2.5 Summary and Response to Reynolds and Chandler Adit Questions

Although the Reynolds and Chandler Adit system is not a part of the current focused feasibility studies, EPA recognizes the actual and potential contribution that this system may provide to overall AMD contamination at the Site. Of the four FFSs, the Adit system is of most importance to the Cropsy action since it is known that precipitation - approximately 72 million gallons per year - and ground water were funneled by the Mine Pits into the historic underground workings. The Adits previously drained this water (now ground water) from the mine workings which are interspersed throughout the sulfide ore body. Contact with the sulfide ore resulted in the transformation of the natural precipitation/ground water into AMD. This AMD then exited the Reynolds Adit and flowed into the Wightman Fork stream.

As part of ongoing emergency activities, it was determined that the continual generation of AMD from the Reynolds Adit could be substantially reduced by plugging the Adit system (see Attachment F to Summitville Action Memorandum #2 dated January 28, 1993.) This would result in the re-establishment of the historic ground water table, thereby eliminating oxygen from the mine workings/Adits. Concurrent evaluation of alternatives to address the Cropsy Waste Pile included moving the CWP to the Mine Pits from which it was originally excavated. Overall evaluation of the two actions (Reynolds and CWP) strongly favored the filling and capping of the Mine Pits to prevent water infiltration through the sulfide ore body.

If the evaluation of the two actions had been unfavorable, it is likely that the Mine Pits would have needed to be regraded and a drainage notch constructed to reclaim the area. The movement of the waste piles to the Mine Pits, therefore, has actually resulted in a cost savings overall since the CWP remedy meets the needs of both portions of the Site. In addition, the reduction in volume of AMD generated by CWP and the Adits system will result in the decrease of Water Treatment required at the Site and therefore costs for this third action. Evaluation of the Adit plugs and the re-establishment of the ground water table is ongoing and the information developed will be incorporated into RI/FS documents to support a separate Reynolds Adit/South Mountain ground water ROD.

The evaluation of the two actions was discussed in Attachment F of Action Memorandum #2 and section 5.0 of the EE/CA for the Cropsy Waste Pile, et al. An interim project report on the Reynolds and Chandler Adit plugs was released on October 12, 1994. Each of these documents is included as part of the Summitville Administrative Record and is available to the public.

Comment 1:
The discussion in all the FFSs regarding AMD concentrations/volumes attributed to various sources should have provided a detailed analysis of the chemical mass balances associated with water quality in and adjacent to the property [Summitville Site].

Response:
As Tables 1-4 of the FFSs plainly demonstrate, there is not a steady release of chemicals over time with which to develop chemical mass balances. The bulk of the contaminants are released during periods of high surface water flow such as spring snowmelt or large storm events. As discussed in section 1.3.2.3 of the FFSs, such an attempt is further complicated by the varying nature of the geologic features encountered at the Site. To attempt to develop a chemical mass balance for each chemical and geologic feature for the various time frames does not add any greater understanding of the risks presented by the Site.

Comment 2:
There is concern associated with backfilling of the Mine Pits (with CWP, SDI, and BMD waste materials) since the data suggest that the Mine Pits and the Reynolds Adit are hydraulically interconnected. Because of this hydrogeological connection, a greater understanding regarding the geochemical interrelationship should have been undertaken prior to commencing backfilling activities.

The combined impacts of implementing these two actions is still unaddressed, despite the fact that the combined efforts could well be the reason that another or other alternatives would be preferred.

Response:
EPA agrees that the hydraulic interconnection between the Mine Pits and the Reynolds Adit is an area which bears special attention. If the ground water table - as a result of the Adit plugging - were to rise above the level of the Mine Pits, then the relocated waste piles could be subjected to a varying saturated condition. Because of this concern, EPA placed a continuous three-foot (finished thickness), highly-impermeable clay liner on the bottom and all sides of the Mine Pits. Placement and subsequent compaction by normal construction traffic of the waste piles appear to have resulted in impermeable waste materials. As a result, it is EPA's assessment that some of the relocated waste piles is unlikely to occur as a result of infiltration by the ground water table.

A final cap over the Mine Pits is intended to divert surface infiltration so that saturation of the piles does not occur as a result of precipitation events. The cap also serves to eliminate oxygen, which is required for AMD generation, from entering the waste piles.

As a precautionary, measure, a continuous five-foot layer of lime kiln dust was placed over the clay liner for both the North and South Mine Pits (approximately 1,800 tons of time kiln dust). The lime kiln dust is intended to neutralize any AMD generated as a result of moisture present within the waste piles as they are excavated and placed, and AMD generated by precipitation events occurring during construction. In addition, any surface water infiltration which may occur through the interim caps over the winters of 1993 and 1994 will also be neutralized.

Should the waste piles become saturated despite the design and construction safeguards described above, any AMD generation within the Mine Pits would take place under saturated conditions in a high pH environment (high pH as a result of dissolving the lime kiln dust). As with the ore body, this saturation would result in the elimination of oxygen from the waste piles. This lack of oxygen would prevent the generation of AMD. While a more detailed geochemical discussion may be useful for actual design considerations, it can generally be understood that the sulfide ore body below the Mine Pits presents the highest AMD generating potential for the entire Site. If saturated conditions can minimize the AMD reaction for the sulfide ore body, then the same conditions will also minimize AMD reaction within the waste materials containing less sulfide.

Comments 3:
This section [1.4.1.3 of the CWP FFS] indicated that the Reynolds and Chandler Adits have been plugged, but that the long term effects of plugging the Reynolds Adit and Chandler Adit, and the consequent rise in the South Mountain water table have not been determined.

EPA indicated in its response to comments on the EE/CA that a state-of-the-art groundwater flow model that accounts for flow in fractures is being developed in order to perform such evaluations. However, the Reynolds Adit was plugged prior to completion of such a groundwater flow model evaluation and any publication of results of such evaluations.

Response:
The intent of the "long-term effects" statement was to convey that EPA does not definitively know the actual long-term effects which the plugging will achieve since plugging was only recently completed in March 1994. However, the referenced model has been able to provide some approximation of the resultant ground water table. At this time, a report on the findings of this model is in the final stages of revive prior to its release to the public.

The development of the model was never expected to be completed prior to commencing plugging activities. Instead, it was anticipated that the model would be used to study the effects of changes in site conditions (i.e., removal/remedial actions) on the ground water and Adit system. The model has only recently achieved a relative level of accuracy and is now being evaluated based upon actual field conditions. Because the Adit pluggings were conducted as a time-critical, removal action, no formal public review process was required, though the alternatives analysis for the Reynolds Adit has been a part of the public record since January 28, 1993.

Comment 4:
Plugging of the Reynolds Adit should have been evaluated as a long-term solution at the Site rather than an Interim Remedial Action. Plugging of the Reynolds Adit could cause the following: (1) increase of the water table into the Mine Pits,(2) groundwater to exit the mountain via another shaft or adit (as was the case with the Chandler Adit), and/or (3) the creation of additional point sources of Acid Rock Drainage (ARD) through seeps.

Response:
As discussed previously, the Reynolds and Chandler Adits were plugged as a time-critical, emergency removal action. However, this does not imply that the plugging of the Adits is considered to be interim in nature. After initial consideration by EPA of the three potential effects as listed by the commenter, EPA felt it best to evaluate the impacts to the ground water table and the actual performance of the plugs as a whole

system. As more about the South Mountain ground water regime is known, then a final decision regarding the regime can be developed for long-term considerations.

Comment 5:
EPA apparently has not performed adequate groundwater investigations to evaluate the short- and long-term effects of the Reynolds Adit plugging. Because of the complexity of the groundwater flow system at the Site, as related to fracture flow and the hydrogeologic significance of the mine workings and adits, a groundwater flow model is necessary to evaluate rises in the groundwater table and the potential for significant groundwater discharges through existing adits and shafts. Such modeling efforts must take into account the effects of fractures on groundwater flow characteristics, groundwater recharge primarily through the Mine Pits before and after filling and capping, groundwater discharge seeps, and other significant hydrogeologic boundary conditions such as the underground workings.

Response:
EPA agrees that the South Mountain ground water remedy is complex in nature and can have significant impacts upon the various actions discussed for the Site. As a result, EPA has directed the development of a state-of-the-art, three-dimensional model with assistance from the Office of Surface Mining. Each of the parameters identified by the commenter and other considerations have been incorporated into development of the model. The model has only recently achieved a relative level of accuracy and is now being evaluated based upon actual field conditions. It is anticipated that the model can be developed into a predictive tool for evaluating future actions to be taken at the site.

Comment 6:
As anticipated by individuals commenting on the EE/CA, plugging of the Reynolds Adit in February 1994 apparently caused discharge of groundwater through the existing Chandler Adit thus providing another source of ARD. As a result, EPA plugged the Chandler Adit in March 1994. Shortly thereafter, the plug began leaking low pit metals-laden waters. An explanation for the failure of the Chandler Adit plug is not discussed in the FFS. Failure of the plug could be primarily a result of one or both of the following flaws in establishing the plug design parameters: 1) failure to use conservative hydraulic parameters, such as using the maximum possible hydrostatic head expected at the plug that would result from plugging of the Reynolds Adit; and 2) failure to select suitable competent rock for keying the plug. This section also mentions that corrective measures are planned for the Chandler Adit, however, no specific discussion of the nature of the contemplated corrective measures is provided.

Response:
Concerns regarding potential discharge from the Chandler Actit once the Reynolds Adit was plugged did result in EPA including plugging of the Chandler Adit as part of the removal action. However, the work for both Adits was conducted in a concurrent fashion and was not based upon actual discharge observed from the Chandler. The Chandler did not fail until May 23, 1994, which is a sufficient amount of time after construction for the plug to have been fully effective.

EPA agrees that the subsequent failure of the Chandler plug is likely to be associated with the plug design or the surrounding rock conditions. The corrective measures for the Chandler are not discussed primarily because the plug failure was still being evaluated. This assessment effort was initiated in November 1994 and it is anticipated that work to repair or replace the Chandler Adit will be completed by Spring 1995.

Comment 7:
EPA should not repeat the same mistake of replugging the Chandler Adit without performing the appropriate hydrogeologic investigations and evaluations. Replugging the Chandler Adit may cause, as was the case in the Reynolds Adit plug, water exiting out of another adit or shaft or significant hydrostatic pressures in the mountain that would cause the development of multiple point sources via seeps at the base of the mountain. As indicated above, the Chandler Adit is presently discharging low pH metals-rich waters directly into Wightman Fork. It is not known why EPA did not open the valve in the Reynolds Adit to reduce or preclude flow from exiting the Chandler Adit and treat this in the PITS facility prior to discharge to Wightman Fork. This demonstrates a failure on EPA's part to develop an overall environmental strategy at the Site, as opposed to a number of disconnected and uncoordinated individual actions.

From an emergency response standpoint, it may have been appropriate to keep the Reynolds Adit open since water from the Reynolds Adit could be readily treated.

Response:
Based upon the short success during the time that the Chandler Adit was functional, it is unlikely that replugging of the Adit will result in discharges from other adits/shafts. The ground water model being developed tends to support this conclusion However, it is known that historic seeps did exist on South Mountain and it is reasonable to expect that these seeps would redevelop. Even so, the rationale for plugging the Adit system was to flood the mine workings and thereby eliminate oxygen from the reaction which generates AMD. This will result in the gradual improvement of the South Mountain ground water and,

therefore, the water quality of the seeps.

The design for the Reynolds Adit included two separate plugs with piping between the plugs. A valve which would allow EPA to drain the water behind the two plugs was to be installed once the second plug was completed. After observing the better-than-expected performance from the first plug, EPA determined that a second plug would be a redundant expenditure and it was eliminated from construction. As a result, the capability to open the valve - as originally considered - did not exist at the time that the Chandler began to discharge to the Wightman Fork. This valving capability has since been installed and EPA has been treating the Chandler discharge at the PITS facility. Rather than a lack of an overall environmental strategy for the Site, this incident is more representative of the extreme physical and timing realities presented by the Site. Overall, discharge from the Chandler Adit produced less flow and less copper concentrations than experienced from the Reynolds Adit during the same time frame of the previous year.

Comment 8:
Plugging the Reynolds Adit may not, in the long term, reduce acid mine drainage flows and may turn out to be a very expensive experiment. Also, this interim action may actually exacerbate site problems and, thus conflict with the National Contingency Plan.

Response:
Base upon current data gathering efforts and the recent predictive capability of the ground water model, EPA has determined that plugging of the Reynolds Adit will result in a reduction of contaminant transport from the Site. Therefore, these actions will not exacerbate Site problems or interfere with the final overall site remedy. However, should monitoring of the South Mountain ground water indicate that the plugging is actually exacerbating Site conditions, the (now installed) valve within the Reynolds Adit can be opened and treatment of the water initiated in the PITS.

Comment 9:
It is stated that "In 1993 and 1994, Emergency Response Removal Actions (ERRA) were taken to reduce contaminant load in untreated Site water. This was achieved in part by...prevention of AMD flow from underground workings..." Plugging the Reynolds Adit probably did not reduce the contaminant load in untreated Site water.

If no immediate reduction of contaminated water flows was expected, what was the rationale for the precipitous action in 1993 and 1994 regarding plugging of the Reynolds Adit? Alternative actions and consequences of combined actions could have been evaluated on sound scientific bases thus providing for recommended alternatives with higher expectations of achievements for interim remedies and final overall site remedies.

Response:
In the spring of 1993, discharge from the Reynolds Adit reached a peak flow of 763 gallons per minute with supersaturated concentrations of copper. Due to treatment capacity limitations at the PITS facility, approximately 600 gallons per minute of the discharge overflowed the holding pond and escaped untreated into the ground or overflowed into the nearby creeks. While this occurred over a limited 3-4 week period, plugging of the Adits eliminated this highly contaminated discharge to the Alamosa drainage during the 1994 spring season.

In general, each of the remedies discussed in the FFSs are anticipated to have a gradual impact upon water quality and cannot be guaranteed to dramatically improve conditions over a short time frame. Also, because of on-going water treatment, implementation of the remedies is expected to allow EPA to discontinue water treatment while maintaining compliance with current water quality standards.

This section [1.4.4.2 of the CWPFFS] does not provide an adequate description of the groundwater flow conditions at the Site. A discussion of the prevailing groundwater flow systems should be provided, including the groundwater flow direction, permeabilities, and storage coefficients. Also, there is no discussion provided on the regional and local hydrogeologic boundary conditions at the Site. It is unclear where the recharge and discharge (seep) areas occur, and the hydrogeologic effect of the underground workings and their significance as a hydrogeologic boundary conditions are unknown. The text does not discuss how plugging of the Reynolds Adit will effect the groundwater table conditions at the Site. If these conditions are unknown, at least a qualitative description is necessary.

The FFS does not include a description of the promised state-of-the-art groundwater flow model that was supposedly developed to make these necessary evaluations. The model, as well as information on model assumptions, model hydrogeologic boundary conditions, should be included in an adequate FFS. The results of such modeling evaluations may significantly alter the conclusions of the FFS with regard to replugging the Chandler Adit. Such simulation would have provided insight into the water table levels which could affect conclusions regarding the effectiveness of the selected alternative.

In addition, EPA does not provide in the FFS a description of the proposed monitoring to determine the effectiveness of the plugging in the short- and long-term. Evaluating the effectiveness of the Reynolds Adit Plug will require monitoring of: (1) fluctuations in the water table; (2) existing seeps; (3) changes in flow quantity; and (4) changes in water quality through these seeps. Also, monitoring the development of additional seeps is critical. Information regarding what EPA is currently considering as baseline for monitoring and what methods will be used to evaluate the effectiveness of plugging is necessary to determine the impact of plugging these two adits, particularly with regard to final site remediation. Further, information on the monitoring efforts currently being performed by EPA to monitor the potential development of additional seeps as a result of the Reynolds Adit plug, and the results of such monitoring, are critical to evaluate the effectiveness of the remedy.

Response:
EPA agrees that inclusion of the ground water model in an FFS is essential to evaluating the effectiveness of a selected alternative for the South Mountain ground water regime. EPA also agrees that the results of monitoring for the various considerations outlined by the commenter are essential in assessing the impact of the Adit system plugging, particularly with regard to final Site remediation. However, the plugging of the Reynolds and Chandler Adits and their impact on the ground water are not the focus of any of the four FFSs provided for public review and inclusion of the suggested information in these FFSs is therefore inappropriate. Nonetheless, the modeling and monitoring efforts are actively being pursued and EPA anticipates that this information will be incorporated into future RI/FS documents to support a separate Reynolds Adit/South Mountain ground water ROD. These documents will be provided for public review and comment prior to remedy selection

3.0 REFERENCES

ALL REFERENCE MATERIAL IS AVAILABLE IN EPA ADMINISTRATIVE RECORD.

Table 1 Copper Content - Site Contaminated Water, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE
COPPER (LBS)

SAMPLE LOCATION	1993 MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	1994 JAN	FEB	MAR	APR	MAY	JUN	JULY TO JUNE COPPER LOAD (LBS)	PERCENT OF CURRENT LOADING	PERCENT OF POTENTIAL LOADING
FRENCH DRAIN SUMP	553	1,121	831	522	1,688	583	414	417	463	409	361	354	508	2,150	8,679		
STREAM A																	
VALLEY CENTER DRAIN																	
FDS-1	1,136	1,418	282	181	198	120	147	122	104	63	50	37	532	1,601	3,434		
DIKE 1 SEEP																	
FDS-2	12	384		18	35	38	22	16					54	302	483		
LPD-1 & ROAD SEEPS																	
FDS-3	827	314	51	34	46	37	28	28	23	17	18	139	258	79	757		
LPD-4 & 5 COMBINED																	
FRENCH DRAIN SUMP	3,191	3,940	1,923	1,513	899	629	481	482	438	374	391	492	2,238	1,410	12,269		2.72%
TOTAL FLOW																	
HEAP LEACH PAD																	
STREAM B	8,348	4,037	791	333	349	148	76	25	4				1,191	1,464	4,278		0.97%
CWP OVERFLOW (550-DO)																	
CROPSY WATER											2,843	1,840	7,411	6,833	18,927		4.20%
(TREATMENT PLANT)																	
HLP LEACHATE	39,384	37,966	33,162	24,688	22,708	21,802	19,035	16,082	13,673	9,334	9,047	7,835	6,103	9,019	192,488		42.76%
(INFLUENT TO CDP)																	
UNDERGROUND WORKINGS																	
STREAM C	53,242	110,739	34,432	20,212	19,272	12,352	6,963	5,319	2,663	142	112	86		1,126	102,679	12,76%	22.80%
REYNOLDS ADIT (AD-O)																	
PITS	12,770	15,551	19,750	18,472	19,272	12,352	6,963	5,319	2,662	94	140	154	0	0	85,178		
(RLYNOLDS ADIT TREATMENT																	
CHANDLER PORTAL													11,754	83,788	95,542	69.63%	21.22%
CROPSY CREEK																	
LPD-2	281	198	31	59	34	28	7	0					194	268	621		
(EAST OF F. D. SUMP)																	
STREAM H	3,624	850	127	111	67	52	26	21	21	15	25	159	542	571	1,737	1.27%	0.39%
CROPSY CREEK																	
POND 4																	
STREAM F	0	761	408	728	323	78	6						1,002	1,965	4,508	3.29%	1.00%
POND 4 DISCHARGE																	
IOWA ADIT													37	223	N/M		
OTHER CONTRIBUTORS TO WIGHTMAN FORK																	
STREAM D	4,438	3,904	1,267	1,788	1,525	873	609	644					458	5,110	12,294	8.96%	2.73%
CLEVELAND CLIFFS																	
STREAM E	3,389	3,455	866	97	31	4							1,513	1,810	4,321	3.15%	0.96%
NORTH DUMP DRAINAGE																	
STREAM G	2,305	1,028											876	237	1,113	0.81%	0.25%
CLAY ORE STOCKPILE (SEEP L)																	
TREATMENT DISCHARGE	2.3	45	31	22	28	32	21	13	11	0	0	0	8	24	189	0.14%	0.04%
TO WIGHTMAN FORK																	
MONTHLY TOTAL OF	54,249	105,231	17,399	4,486	1,974	1,039	662	679	33	63	-3	92	16,151	94,630	137,204	100.00%	
CURRENT CONTRIBUTORS																	
MONTHLY TOTAL OF ALL	117,887	166,680	72,994	49,470	45,173	35,936	27,196	22,574	16,798	9,865	12,417	10,412	33,088	114,332	450,256		100%
POTENTIAL CONTRIBUTORS																	
WF-5.5 WIGHTMAN FORK	47,438	71,161	20,548	6,424	3,682	938	789	676	479	374	399	909	20,424	87,450	143,092		

Table 2 Cyanide Content - Site Contaminated, Water 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE
CYANIDE

	1993							1994									
SAMPLE LOCATION	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JULY TO JUNE COPPER LOAD (LBS)	PERCENT OF CURRENT LOADING	PERCENT OF POTENTIAL LOADING
FRENCH DRAIN SUMP																	
STREAM A	450	542	955	453	245	392	584	699	645	522	420	509	591	389	6,415		
VALLEY CENTER DRAIN																	
FDS-1	49	38	18	7	7	7	14	6	3	2	1	0	5	14	81		
DIKE 1 SEEP																	
FDS-2	8	112		20	8	28	12	17					5	12	102		
LPD-1 & ROAD SEEPS																	
FDS-3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2		
LPD-4 & 5 COMBINED																	
FRENCH DRAIN SUMP	1,245	1,216	1,027	1,198	636	476	495	514	495	429	464	530	599	486	7,348		4.42%
(EFFLUENT)																	
HEAP LEACH PAD																	
STREAM B	0	0	0	0	0	0	0	0	0				0	0	0		
CWP OVERFLOW (550-DO)																	
CROPSY WATER											0	0	0	0	0		
(TREATMENT PLANT)																	
HLP LEACHATE	34,185	29,091	25,667	17,914	16,692	16,761	16,779	14,655	13,382	8,812	8,637	7,264	5,229	8,125	158,717		95.54%
(INFLUENT TO CDP)																	
UNDERGROUND WORKINGS																	
STREAM C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0.00%
REYNOLDS ADIT (AD-O)																	
PITS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	
(RLYNOLDS ADIT TREATMENT																	
CHANDLER PORTAL													0	0	0	0.00%	0.00%
CROPSY CREEK																	
LPD-2	0	0	0	0	0	0	0	0						0	0		
(EAST OF F. D. SUMP)																	
STREAM H	26	104	1	17	3	0	15	0	0	1	0	1	9	7	84	6.56%	0.03%
CROPSY CREEK																	
POND 4																	
STREAM F	0	0	0	0	0	8	0						0	0	8	1.02%	0.00%
POND 4 DISCHARGE																	
IOWA ADIT														0	N/M		
OTHER CONTRIBUTORS TO WIGHTMAN FORK																	
STREAM D	1	0	0	0	0	0	0	0					0	0	0	0.00%	0.00%
CLEVELAND CLIFFS																	
STREAM E	0	0	0	0	0	0								0	0	0.00%	0.00%
NORTH DUMP DRAINAGE																	
STREAM G	0	0											0	0	0	0.03%	0.00%
CLAY ORE STOCKPILE (SEEP L)																	
TREATMENT DISCHARGE	153	164	200	74	83	99	54	43	16	0	0	0	35	117	722	92.09%	0.43%
TO WIGHTMAN FORK																	
MONTHLY TOTAL OF	180	268	201	81	86	107	70	43	16	1	1	1	45	124	784	100.00%	
CURRENT CONTRIBUTORS																	
MONTHLY TOTAL OF ALL	35,457	30,411	26,595	19,129	17,230	17,245	16,289	15,169	13,678	9,241	9,101	7,794	5,838	8,618	186,127		100%
POTENTIAL CONTRIBUTORS																	
WF-5.5 WIGHTMAN FORK	1,518	1,328	228	405	167	32	154	155	95	0	0	22	280	2,998	4,538		

Table 3a Site Surface Water and Treatment Plant Flow Rates, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE
FLOW RATE (GPM)

	1993							1994								
SAMPLE LOCATION	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	HIGH FLOW (GPM) (7/93 TO 6/94)	LOW FLOW (GPM) (7/93 TO 6/94)
FRENCH DRAIN SUMP	58	57	72	59	62	71	70	74	73	70	70	78	132	119	132	59
STREAM A																
VALLEY CENTER DRAIN																
FDS-1	40	29	8	5	5	3	4	3	1	1	1	1	14	38	38	1
DIKE 1 SEEP																
FDS-2	1	19		3	3	3	3	2					4	20	20	2
LPD-1 & ROAD SEEPS																
FDS-3	25	25	14	12	12	13	11	10	7	6	5	5	10	13	14	5
LPD-4 & 5 COMBINED																
FRENCH DRAIN SUMP	151	190	124	103	95	70	70	70	70	70	70	87	185	181	185	70
(EFFLUENT)																
HEAP LEACH PAD																
STREAM B	364	191	47	18	15	8	4	2	0				28	44	47	0
CWP OVERFLOW (550-DO)																
CROPSY WATER											108	74	176	162	176	74
(TREATMENT PLANT)																
HLP LEACHATE	594	723	677	566	647	774	674	639	650	621	648	661	534	750	774	534
(INFLUENT TO CDP)																
UNDERGROUND WORKINGS																
STREAM C	486	783	398	272	229	180	119	97	45	9	7	6		58	398	6
REYNOLDS ADIT (AD-O)																
PITS	74	113	192	218	237	180	119	97	69	67	72	86	0	0	237	0
(REYNOLDS ADIT TREATMENT																
CHANDLER PORTAL													369	571	571	369
CROPSY CREEK																
LPD-2	26	28	2	5	2	2							13	29	29	2
(EAST OF F. D. SUMP)																
STREAM H	2,805	2,508	643	327	239	104	69	62	52	36	41	89	1,346	2,450	2,450	36
CROPSY CREEK																
POND 4																
STREAM F		765	115	318	138	33	4						948	766	948	4
POND 4 DISCHARGE																
IOWA ADIT													20	134	N/M	N/M
OTHER CONTRIBUTORS TO WIGHTMAN FORK																
STREAM D	202	168	52	83	59	43	33	37					109	168	168	33
CLEVELAND CLIFFS																
STREAM E	284	282	67	13	4	2							254	314	314	2
NORTH DUMP DRAINAGE																
STREAM G	49	66											37	41	41	37
CLAY ORE STOCKPILE (SEEP L)																
MONTHLY TOTAL OF	3,752	4,440	1,083	795	440	182	106	99	52	36	41	89	3,083	4,366	4,366	36
CURRENT CONTRIBUTIONS																
MONTHLY TOTAL OF ALL	4,935	5,657	2,123	1,700	1,420	1,214	973	907	818	736	874	917	3,988	5,484	5,484	736
POTENTIAL CONTRIBUTORS																
WF-5.5 WIGHTMAN FORK																

Table 3b Site Surface Water and Treatment Plant Water Volume

1993/1994 ENVIRONMENTAL ANALYSIS-SUMMITVILLE SUPERFUND SITE
FLOW RATE (GPM)

SAMPLE LOCATION	MAY 93	JUNE 93	JULY 93	AUG 93	SEPT 93	OCT 93	NOV 93	DEC 93	JAN 94	FEB 94	MAR 94	APR 94	MAY 94	JUN 94	HIGH FLOW (GPM) (7/93 TO 6/94)	LOW FLOW (GPM) (7/93 TO 6/94)
FRENCH DRAIN SUMP																
STREAM A	2,589,120	2,462,000	3,214,080	2,633,780	2,678,400	3,169,440	3,024,000	3,303,360	3,258,720	2,822,400	3,124,800	3,369,600	5,892,480	5,148,440	5,892,480	2,633,760
VALLEY CENTER DRAIN																
FDS-1	1,785,600	1,252,800	357,120	223,200	216,000	133,920	172,800	133,920	44,640	40,320	44,640	43,200	624,960	1,637,280	1,637,280	40,320
DIKE 1 SEEP																
FDS-2	44,540	820,000		133,920	129,600	133,920	129,600	89,280					178,550	846,720	846,720	89,280
LPD-1 & ROAD SEEPS																
FDS-3	1,116,000	1,080,000	624,960	513,360	518,400	580,320	475,200	448,400	312,480	241,920	223,200	216,000	448,000	540,000	624,960	216,000
LPD-4 & 5 COMBINED																
FRENCH DRAIN SUMP	6,740,640	8,208,000	5,535,360	4,597,920	4,104,000	3,124,800	3,024,000	3,124,800	3,124,800	2,822,400	3,124,800	3,758,400	8,258,400	6,955,200	8,258,400	2,822,400
(EFFLUENT)																
HEAP LEACH PAD																
STREAM B	16,248,960	8,251,200	2,098,080	803,520	648,000	357,120	172,800	89,280	0				1,249,920	1,916,080	2,098,080	0
CWP OVERFLOW (550-DO)																
CROPSY WATER											4,821,120	3,196,800	7,856,640	6,998,400	7,856,640	3,196,800
(TREATMENT PLANT)																
HLP LEACHATE	26,516,160	31,233,600	30,221,280	25,266,240	27,950,400	34,551,360	29,116,800	28,524,960	29,016,000	25,038,720	28,926,720	28,555,200	23,837,760	32,400,000	34,551,360	23,837,760
(INFLUENT TO CDP)																
UNDERGROUND WORKINGS																
STREAM C	21,695,040	32,961,600	17,766,720	12,142,080	9,892,600	8,036,200	5,140,800	4,330,080	2,035,584	351,850	305,021	244,080		2,496,960	17,766,720	244,080
REYNOLDS ADIT (AD-O)																
PITS	3,303,360	4,881,600	8,570,880	9,731,520	10,238,400	8,035,200	5,140,800	4,330,080	3,080,160	2,701,440	3,214,080	3,715,200	0	0	10,238,400	0
(REYNOLDS ADIT TREATMENT																
CHANDLER PORTAL													16,472,160	24,654,240	24,554,240	18,472,160
CROPSY CREEK																
LPD-2	1,160,640	1,209,600	89,280	233,200	86,400	89,280							580,320	1,252,800	1,252,800	86,400
(EAST OF F. D. SUMP)																
STREAM H	125,215,200	108,345,600	28,703,520	14,597,280	10,324,800	4,642,580	2,980,800	2,767,680	2,321,280	1,451,520	1,830,240	3,844,800	60,085,440	105,831,360	105,831,360	1,451,521
CROPSY CREEK																
POND 4																
STREAM F	0	33,091,200	5,133,200	14,195,520	5,961,600	1,473,120	172,800						42,318,720	33,069,600	42,318,720	172,800
POND 4 DISCHARGE																
IOWA ADIT													892,800	5,771,520	N/A	N/A
OTHER CONTRIBUTORS TO WIGHTMAN FORK																
STREAM D	9,017,280	7,257,600	2,321,280	3,705,120	2,548,800	1,919,520	1,425,500	1,651,680					4,865,760	7,245,504	7,245,504	1,425,600
CLEVELAND CLIFFS																
STREAM E	12,677,760	12,182,400	2,990,880	580,320	172,800	66,960							11,338,560	13,564,800	13,584,800	66,960
NORTH DUMP DRAINAGE																
STREAM G	2,187,360	2,851,200											1,651,680	1,753,920	1,753,920	1,651,680
CLAY ORE STOCKPILE (SEEP L)																
MONTHLY TOTAL OF	167,489,280	191,808,000	48,345,120	35,488,800	19,008,000	8,102,160	4,579,200	4,419,360	2,321,280	1,451,520	1,830,240	3,844,800	136,732,320	188,516,384	188,616,384	1,451,520
CURRENT CONTRIBUTIONS																
MONTHLY TOTAL OF ALL	220,298,400	244,382,400	94,770,720	75,858,000	61,603,200	54,170,640	42,023,600	42,023,600	40,488,480	36,497,664	29,675,520	39,006,432	39,599,280	177,935,040	236,888,064	29,675,520
POTENTIAL CONTRIBUTORS																
WF-5.5 WIGHTMAN FORK	694,509,120	588,513,600	149,677,920	103,921,920	48,859,200	31,002,480	30,585,600	22,007,520	15,356,160	9,394,550	13,168,800	55,252,800	467,120	641,105,920	541,105,920	9,394,560

Table 4
Contaminant Content at High and Low Flows -
Identified AMD Streams

Stream:	Stream A	Stream B	Stream C	Stream D	Stream E	Stream F	Stream G
Recording Date							
High Flow	12/08/93	5/24/93	6/10/93	6/02/93	6/08/93	6/02/93	6/15/93
Low Flow	9/08/93	12/16/93	5/13/93	11/05/93	9/21/93	6/10/93	11/17/93
GPM							
High	74.4	597.5	910	348	283	105	1176
Low	62.1	1	74	19	1	24	0.5
Manganese Total Recoverable							
High	56.6	72	35.2	72	40	55.5	10
Low	28.61	63.54	15.4	66.09	16.6	54.75	65.53
Iron T.R.							
High	297.6	1240	1738	636	447.5	2157.1	109.25
Low	438.1	793	368.4	310.8	76.88	800	26.21
Total Cyanide							
High Flow	25.25	NR	NR	0.017	NR	<.01	<.01
Low Flow	10.95	NR	NR	<.01	NR	<.01	<.01

Aluminum and Zinc Content at High and Low Flows -
Identified AMD Streams

Stream:	Stream A	Stream C	Stream D	Stream E	Stream F	Stream G	Stream H	FD-1
Recording Date								
High Flow		6/22/94	6/20/94		No information Available			6/21/94
Low Flow	2/25/94	5/01/94	5/30/94					
Zinc digested								
High		101	9.73					105
Low	15.98	64.1	4.99					
Aluminum, dig.								
High		164.4	154.5					992.1
Low	43	967.3	60.78					

All concentrations - mg/l
NR - Not Recorded

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Table 7
Potential Chemical Specific ARARs

Standards, Requirements, Criteria, Limitations	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
National Primary Drinking Water Standards	40 C.F.R. Part 141, Subpart B pursuant to 42 U.S.C. §§ 300g-1 and 300j-9. State: 5 CCR 1003-1 pursuant to C.R.S. § 25-1-107(1)(x)	Establishes numeric standards for public water systems. Maximum contaminant levels (MCLs) are established to protect human life-time drinking water exposure.	No	No public water supplies are present, the State of Colorado has comprehensive ground-water classification system, including numeric standards equivalent to (MCLs). See section 3.2.1.
National Secondary Drinking Water Standards	40 C.F.R. Part 143, pursuant to 42 U.S.C. §§ 3008- 1(c) and 300j-9	Establishes aesthetics-related standards for public water systems (secondary maximum contaminant level).	No	Protects aesthetic character, not relevant to protection of human health or environment.
Maximum Contaminant Level Goals	40 C.F.R. Part 14 1, Subpart F, pursuant to 42 U.S.C. § 300g-1	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects, with an adequate margin of safety.	No	No non-zero MCLGs set at levels less than MCLs were identified for contaminants of concern.
Colorado Ground Water Standards	State: 5 CCR 1002-8 §§ 3.11.0 - 3.11.8	Establishes a scheme for identifying groundwater specified areas, for classification of Colorado ground water and provides numeric standards. Also, establishes an interim narrative standard for all unclassified ground water, supplementing statewide standards,	Applicable	See section 3.2.1.

Table 7 (continued)
Chemical Specific Criteria To-Be-Considered (TBC)

Standards, Requirements, Criteria, Limitations	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
RCRA Groundwater Protection Standard (RCRA GPS)	40 CFR §§ 264.92 - 264.101 State: 6 CCR 1007-3	Establishes standards for ground water quality related to RCRA hazardous waste facilities.	No	The State of Colorado has comprehensive ground-water classification system, including numeric standards equivalent to MCLs and RCRA GPS.
SURFACE WATER:				
Colorado Water Quality Standards	State: 5 CCR 1002-8, §§ 3.1.0 - 3.1.17	Establishes standards and classifications for Colorado surface waters.	Applicable	See section 3.1.1.
Federal Water Quality Criteria	40 C.F.R. Part 131 Quality Criteria for Water, 1986, pursuant to 33 U.S.C. § 1314	Sets criteria for surface water quality based oil toxicity to aquatic organisms and human health.	Relevant and Appropriate	See section 3.1.2.
AIR:				
National Primary and Secondary Ambient Air Quality Standards	40 C.F.R. Part 50, pursuant to 42 U.S.C. § 7409. State: C.R.S. § 25-7-108, 5 CCR 1001-14.	Establishes standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead),	Applicable	See section 3.4.
National Emission Standards for Hazardous Air Pollutants	40 C.F,R, Part 61, Subparts N, O, P Pursuant to 42 U.S.C. § 7412, State: C.R.S. § 25-7-108, 5 CCR 1001-10	Sets emission standards for designated hazardous pollutants.	No	Air emissions are not anticipated after construction activities are complete. See section 3.4.
SOILS:				
Toxic Substances Control Act, PCB Spill Cleanup Policy	52 FR 10688 April 2, 1987	Establishes guidance cleanup levels for PCB contaminant soils.	Not considered	There is no evidence that PCB spills have occurred.
Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites	EPA Directive #9355.4-02, September 1989.	Established guidance cleanup levels for lend contaminated soils.	Considered	See section 3.3.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant Appropriate	Comment
SOLID WASTE DISPOSAL ACT ("SWDA")				
Guidelines for the Thermal Processing of Solid Wastes	40 C.F.R. Part 240, pursuant to 42 U.S.G, § 6901, et seq.	Prescribes guidelines for thermal processing of municipal solid wastes.	No	Thermal processing will not occur.
Guidelines for the Land Disposal of Solid Wastes	40 C.RS. Part 241, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements and procedures for land disposal of solid wastes.	No	Disposal of mine wastes and closure of mines are specially addressed by the Colorado Mined Land Regulations. See section 4.2.
Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities	State: 6 CCR 1007-2, pursuant to C.R.S. § 30-20-101 and C.R.S. §30.20-102, et seq.	Establishes requirements and procedures for land disposal of solid wastes and tile siting of disposal facilities.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2
Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste	40 C.F.R. Part 243, pursuant to 42 U.S.C. § 6901, et seq.	Establishes guidelines for collection of residential, commercial, and institutional solid wastes.	No	Not relevant.
Source Separation for Materials Recovery Guidelines	40 C.F.R. Part 246, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements and recommended procedures for source separation by federal agencies of residential, commercial, and institutional solid wastes.	No	Not relevant. Creates no substantive cleanup requirements.
Guidelines for Development and Implementation of State Solid Waste Management Plans	40 C.F.R. Part 256, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements for federal approval of state programs to regulate open dumps.	No	Creates no substantive cleanup requirements.
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 C.F.R. Part 257, pursuant to 42 U.S.C. § 6901, et seq.	Establishes criteria for solid waste disposal facilities and practices.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2.
Hazardous and Waste Management System: General	40 C.F.R. Part 260 State: 6 CCR 1007-3 Part 2601	Establishes procedures and criteria for modification or revocation of any provision in parts 260-265.	No	Creates no substantive cleanup requirements.
Identification and Listing of Hazardous Waste	40 C.F.R. Part 261, pursuant to 42 U.S.C. § 6921 State: 6 CCR 1007-3 Part 261, pursuant to C.R.S. § 25-15-302	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 C.F.R. Parts 262-265 and Parts 124, 270,271.	Applicable	Provides for the identification of hazardous wastes; used to determine disposal criteria for sludges & spent process chemicals generated from water treatment.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Standards Applicable to Generators of Hazardous Waste	40 C.F.R. Part 262, pursuant to 42 U.S.C. § 6922 State: 6 CCR 1007-3 Part 262, pursuant to C.R.S. § 25-15-302	Establishes standards for generators of hazardous waste.	Applicable	If hazardous waste are generated onsite and managed offsite the requirements are applicable. Used to handle process chemicals and sludge management for water treatment.
Standards Applicable to Transporters of Hazardous Waste	40 C.F.R. Part 263, pursuant to 42 U.S.C. § 6923 State: 6 CCR 1007-3 Part 263. pursuant to C.R.S. § 25-15-302, 4 CCR 723-18	Establishes standards which apply to persons transporting hazardous waste within the U.S. if the transportation requires a manifest under 40 C.F.R. Part 262.	Applicable	If hazardous wastes are transported offsite the requirements are applicable.
Standards for Owners and Operators of hazardous Waste Treatment, Storage, and Disposal Facilities	40 C.F.R. Part 264, pursuant to 42 U.S.C. § 6924, 6925 State: 6 CCR 1007-3 Part 264, subparts B, C, D, E, F, G, K, L, and N, pursuant to C.R.S. § 25-15-302	Establishes standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.	Yes	See section 4:1.
Interim Standards for Owners an Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 C.F.R. Part 265 State: 6 CCR 1007-3, Part 265	Establishes standards for management of hazardous waste during interim status.	Relevant and Appropriate	Establishes no substantive standards applicable or relevant and appropriate to the HLP.
Standards for the management of Specific hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	40 C.F.R. Part 266 State: 6 CCR 1007-3, Part 267	Establishes requirements which apply to recyclable materials that are reclaimed to recover economically significant amounts of precious metals. including gold and silver.	No	Not relevant to activities al the site.
Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities	40 C.F.R. Part 267 State: 6 CCR 1007-3, Part 267	Establishes minimum national standards that define acceptable management of hazardous waste for new land disposal facilities.	No	Part 267 regulations are nc longer effective after February 13, 1983.
Hazardous Waste Permit Program	40 C.F.R. Part 270 State: 6 CCR 1007-3, Part 100	Establishes provisions covering basic EPA permitting requirements.	No	A permit is not required for onsite CERCLA response actions.
Underground Storage Tanks	40 C.F.R. Part 280	Establishes regulations related to underground storage tanks.	No	The use of or remediation of underground storage tanks is not anticipated.
SAFE DRINKING WATER ACT				
Underground Injection Control Regulations	40 C.F.R. §§ 144,12, 144.24, and 144.25, pursuant to 42 U.S.C. § 121 (e)(1)	Establishes requirements for injection of waste water into wells and aquifers.	No	Underground injection is not anticipated.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
CLEAN WATER ACT				
National Pollutant Discharge Elimination System	40 C.F.R. Parts 122, 125 pursuant to 33 U.S.C. § 1342 5 CCR 1002-2, §§ 6.1.0 to 6,18,0, pursuant to C.R.S. § 25-8-501	Requires permits for the discharge of pollutants from any point source into waters of the United States including stormwater.	Applicable	See sections 4.3 and 4.4.
Amendment to the Settlement of July 1, 1991	July 21, 1992 agreement between Co. Mined Reclamation Board, Co. Mined Reclamation Division, CO. Water Quality Control Division, the Executive Director of the CDPHE and the SCMCI	Establishes Numerical Criteria Limits for water quality for outfall 004 (WFS.5) an a compliance plan	Considered	
Effluent Limitations	40 C.F.R. Part 440, pursuant to 33 U.S.C. § 1311 5 CCR 1002-3, §§ 10.1 to 10.1.7., pursuant to C.R.S. § 25-8-503	Sets technology-based effluent limitations for point source discharges in the Ore Mining and Dressing Point Source category. Also provides exemption for release of storm water where defined BMP criteria are implemented.	Relevant and Appropriate	See section 4.3.
National Pretreatment Standards	40 C.F.R. Part 403, pursuant to 33 U.S.C. § 1317	Sets standards to control pollutants which pass through or interfere with treatment processes in publicly owned treatment works or which may contaminate sewage sludge.	No	No discharge to a publicly owned treatment works is anticipated.
Toxic Pollutant Effluent Standards	40 C.F.R. Part 129, pursuant to 33 U.S.C. § 1317	Establishes effluent standards or prohibitions for certain toxic pollutants: aldrin/dieldrin, DDT, endrin, toxaphene, benzidine, PCBs.	No	The discharge of specified pollutants is not anticipated.
Dredge or Fill Requirements (Section 404)	40 C.F.R. Parts 230, 231 33 C.F.R. Part 323, pursuant to 33 U.S.C. § 1344	Requires permits for discharge of dredged or fill material into navigable waters.	No	No construction activities are applicable involving dredging in water treatment.
Marine Protection, Research & Sanctuary Act	13 U.S.C. §§ 1401-1445	Regulates ocean dumping.	No	Ocean dumping will not occur.
Toxic Substances Control Act PCB Requirements	15 U.S.C. § 2605(e) 40 C.F.R. Part 761	Establishes disposal requirements for PCBs	No	At this time it is not anticipated that remedial activities will involve tile disposal of PCBs.
Uranium Mill Tailings Radiation Control Act	42 U.S.C. §§ 7901-7942 42 U.S.C. § 2022	Establishes requirements related to uranium mill tailings.	No	Uranium mill tailings are not present at the site.
Surface Mining Control and Reclamation Act	30 U.S.C. §§ 1201-1328	Establishes provisions designed to protect the environment from the effects of surface coal mining operations.	No	Not relevant. Creates no substantive cleanup requirements.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Occupational Safety and Health Act	29 U.S.C. §§ 651-678	Regulates worker health and safety.	No	While not an ARAR, these requirements will apply during implementation of remedies at the site.
Federal Mine Safety and Health Act	30 U.S.C. §§ 801-962	Regulates working conditions in underground mines to assure safety and health of workers.	No	While not an ARAR, the requirements will be met if it becomes necessary to access underground mine workings.
Hazardous Materials Transportation Act, D.O.T. Hazardous Materials Transportation Regulations	49 U.S.C. §§ 1801-1813, 49 C.F.R. Parts 107, 171-177	Regulates transportation of hazardous materials	Applicable	If hazardous materials are transported offsite these regulations will be attained. Will apply to sludges or spent or process chemicals if determined hazardous.
Colorado Noise Abatement Statute	State: C.R.S. §§ 25-12-101, et seq.	Establishes standards for controlling noise.	No	While not an ARAR, applicable standards will be met during construction activities at the Summitville site.
Colorado Mined Land Reclamation Act	State: C.R.S. § 34-32-101 et seq. and regulations, 2 CCR 407-1	Ragulates all aspects of mining, including location of operations, reclamation, and other environmental and socioeconomic impacts.	Yes	See section 4.6.
National Historic Preservation Act	16 U.S.C. § 470 40 C.F.R. § 6.301(b) 36 C.F.R. Part 800 State: C.R.S. §§ 24-80-101-108	EPA must account for the affects of any action on any property with historic, architectural, archeological or cultural value that is listed or eligible for listing on the National Register of Historic Places, or the Colorado Register of Historic Places.	Applicable	A survey will be performed so that the Colorado State Historic Preservation Officer may determine if parts of the site are eligible for inclusion on the State or National registers. (See section 5.2).
Archeological and Historic Preservation Act of 1974	16 U.S.C. § 469 40 C.FR. § 6.301(c)	Establishes procedures to preserve Historical and arcbeological data which might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	Applicable	A survey will be performed to identify data that requires protection during remedial activities.
Historic Sites Act of 1935, Executive Order 11593	16 U.S.C. §§ 461 et seq. 40 C.F.R. § 6.301(a)	Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	Applicable	A survey will be performed to identify potential natural landmarks.
Colorado Wildlife Enforcement and Penalties	State: C.R.S. §§ 33-1-101, et seq.	Prohibits actions detrimental to wildlife.	Applicable	During the design phase of the remedy, consideration will be given to the protection of wildlife.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Wildlife Commission Regulations	State: 2 CCR 405-0	Establishes specific requirements for protection of wildlife.	Applicable	During the design phase or the remedy, requirements for the protection of wildlife will be met in the Summitville Mine area.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 661-666 40 C.F.R. § 6.302(g)	Requires consultation when federal department or agency proposes or authorizes any modification of any stream or other water body to provide for adequate provision for protection of fish and wildlife resources.	Applicable	Prior to modification of water bodies appropriate agencies will be consulted. See section 5.1.
Endangered Species Act	16 U.S.C. §§ 1531-1543 50 C.F.R. Parts 17, 402 40 C.F.R. § 6.302(h) State: C.R.S. §§ 33-2-101, et Seq.	Requires that federal agencies insure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.	Applicable	A survey of threatened and endangered species is underway. Prior to any action that would jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat, appropriate State and Federal agencies will be consulted. See section 5.3.
Coastal Zone Management Act	16 U.S.C. §§ 1451-1464	Prohibits federal agencies from undertaking any activity that is not consistent with a sinless approved coastal zone management program.	No	The site is not in the vicinity of a coastal zone.
Wild and Scenic Rivers Act	16 U.S.C. §§ 1271-1287 40 C.F.R. § 6.302(e) 36 C.F.R. Part 297	Establishes requirements applicable to water resource development projects affecting wild, scenic, or recreational rivers within or studied for inclusion in the National Wild and Scenic Rivers System.	Applicable	The site is not a wild, scenic, or recreational river in the National Wild and Scenic River Systems. It will be determined if any part of the site is included in the inventory of rivers under consideration.
Executive Order on Protection of Wetlands	Exec. Order No. 11, 990 40 C.F.R. § 6.302(b) and Appendix A	Requires federal agencies to evaluate life potential effects of actions they may take in wetlands to minimize adverse impacts to the wetlands.	Applicable	Wetlands will be inventoried and considered.
Executive Order on Floodplain Management	Exec. Order No. 11, 988 40 C.F.R. § 6.302(b) and Appendix A	Requires federal agencies to evaluate life potential effects of actions they may take in a floodplain to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.	Applicable	Floodplains potentially impacted will be inventoried and considered.
Rivers and Harbors Act of 1899, Section 10 Permit	33 U.S.C. § 403 33 C.F.R. Parts 320-330	Requires permit for structures or work in or affecting navigable waters.	No	Surface water of the Summitville Mine Site are not navigable within the meaning of Section 10 of the Rivers and Harbors Act of 1899.

Table 8

Numeric Surface Water Quality Goals and ARARs
Alamosa River - Monitoring Station AR-45.4

METAL	SURFACE WATER QUALITY GOALS Class 1 (TVS)
pH	6.5-9.0
Aluminum, chronic	87ug/l dissolved, May 1 through September 30 only. For balance of year Chronic = Acute TVS = 750 ug/l dissolved
Arsenic, acute	50ug/l, total recoverable, 1-day
Cadmium, chronic	2.3ug/l dissolved @ 250mg/l hardness
Chrome VL, chronic	11ug/l dissolved
Copper, chronic	30ug/l dissolved, based upon 85th percentile ambient data from segment 3a
Cyanide	5ug/l, 1-day
Iron, chronic	12,000ug/l, total recoverable, based upon 85th percentile ambient data
Lead, chronic	14ug/l dissolved @ 250mg/l hardness
Manganese, chronic	1000ug/l, dissolved
Mercury, chronic	0.01ug/l, total recoverable
Nickel, chronic	192ug/l dissolved @ mg/l hardness
Silver, chronic, trout	0.36ug/l dissolved @ 250mg/l hardness
Zinc, chronic	230ug/l dissolved @ 250mg/l hardness

Note: Based upon WQCD finding of 250mg/l hardness. Reservoir.

Table 9
Evaluation of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Water Treatment	Alternative 3 Removal to Mine Pits	Alternative 4 Cropsy Valley Adit Drain	Alternative 5 Cropsy Channel Drainage
Overall Protection of Human Health and the Environment	No	No	Yes	Yes	Yes
Compliments with ARARs	No	Yes	Yes	Yes	Yes
Long-term Effectiveness	Low	Low	High	Moderate	Moderate
Reduction of Toxicity, mobility, or volume	No treatment of sources of contamination	No treatment of sources of contamination	No treatment of sources of contamination	No treatment of sources of contamination	No treatment of sources of contamination
Short-term effectiveness	Low	High	High	High	High
Implementability	Easy	Moderate	Easy	Moderate	Moderate
Cost:					
Total Capital	$ 270,000	$ 290,000	$ 23,200,000	$ 27,600,000	$ 26,600,000
Annual Treatment and Assessment	$ 0	$ 9,700,000	$ 900,000	$ 1,400,000	$ 900,000
Present Worth *	$ 270,000	$ 86,000,000	$ 40,800,000	$ 56,400,000	$ 46,800,000

* The present worth calculation for Alternative #2 is based on a 5% rate for a ten year period. The present worth calculation for the remaining Alternatives were based on a 5% rate for a thirty year period.

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